The Non-Heredity of Inebriety

Leslie E. Keley M.D. LL.D.

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THE NON-HEREDITY OF INEBRIETY

BY

LESLIE E. KEELEY, M.D., LL.D.

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PREFACE.

I have endeavored in the following pages to set forth in detail my theory that inebriety is a disease that can be readily cured, and that it is not hereditary. Hence the title, "The Non-Heredity of Inebriety," as expressive of the central idea of the questions discussed.

In their individual and social relations the importance of the questions considered is second to none that have attracted the attention of thinking people during the present century.

I venture to express the hope that whatever repetition or rhetorical fault may appear in this volume may find excuse in the endeavor to impress and fix in mind, by the employment of well known educational methods, line upon line and precept upon precept, the statements of laws, principles, and facts herein laid down.

LESLIE E. KEELEY.

THE NON-HEREDITY OF INEBRIETY.

CHAPTER I.

MEDICAL CREEDS AND MEDICAL DEVELOPMENT.

ALL men who have read medical history know the general steps of the development of medicine as a science and art; those who have studied the pathological sciences and therapeutical arts know that each step has been creed-bound, having been taught and believed as a dogma.

The doctrine of the humors in pathology—the wet, dry, and solid pathologies—is an example of these dogmatic theories in medical development. Relating to cause, the most diverse theories have been believed. Until a few years ago no definite, adequate creed for disease was known, and, consequently, there was no end to theoretical causes. Heat, cold, rest, labor, overfeeding, starvation, "epidemic constitution of the air," poisons, food, water, heredity, contagion, infection, overwork, no work, sin and the moral vices were alike credited with causing disease.

The general principle I wish to notice is that in causation, or in the science of the etiology of disease,

the law is that like causes, meeting with like resistance, produce like diseases. It is also a law that each special disease has its special cause.

In therapeutics, or cure, I wish to present the principle, or law, that all cures are special in character. There is no such thing as a general cure for special diseases, nor is there any such thing as a general cause for any special disease.

Extremely high temperature is not the cause of any special disease, as cholera or yellow fever. Extremely low temperature does not cause pneumonia or rheumatism. Insufficient or poor diet does not cause consumption or leprosy. These diseases have each a special cause.

The actual cures for diseases are very few indeed. Nearly all cures are preventives. The reason is that remedies are too general for special diseases. It was undoubtedly the intention of the Final Design that some day all disease should disappear; but it must be the result of prevention, logically, rather than of cure; although we may admit that the more recent discoveries in the etiology of disease and the successful methods of prevention have a certain amount of curative power.

In the problem of cure one important factor is omitted from most calculations. This is the establishment of a degree of immunity, which is the result of nearly all diseases. It is this development of immunity which causes the termination of the disease and also prevents a return, or a relapse, or another attack by the same disease. A cure for any

disease verifies itself if it causes the abrupt termination of the disease before its so-called natural course is ended. Whether we accept the doctrine that "like cures like" or "unlike cures like" the fact remains that remedies of a general character, as used in the treatment of special diseases, cure or antagonize results or symptoms and not causes. The remedies do not cure the disease, but they cure high temperature, low temperature, pain, paralysis, heart failure, deficient elimination, and other like symptoms and results. Too high or too low blood pressure, too frequent or too slow heart action are examples of resultants or symptoms of diseases; general remedies are addressed to general symptoms in the treatment of disease. The symptoms are cured, but not the disease. The latter, if cured at all, is done by a more specific remedy in each case.

The mycotic diseases are each caused by a special ptomaine, manufactured by a special microbe. The fact seems paradoxical that this ptomaine superinduces the disease and also causes the termination of the disease, or its cure, as well as an immunity to the disease, or its prevention; but such appears to be the truth.

The philosophy of this pathology appears to be that the germ manufactures the poison, which is resisted as much as possible by the tissue cells. The type of the disease is determined by the different degrees of resistance possessed by the different tissues and organs. In time the cells acquire a tolerance which enables them to bear all the

poison the germ can manufacture, following which the disease must come to an end. This acquired tolerance to the poison is not lost, for a longer or shorter time, by the cells, and while it lasts the immunity to the disease is secured. Immunity is effected by a variation of the cells and nuclei, caused by poisoning them, which variation enables them to resist the poison.

In the treatment of a disease of this nature it is clear that unlike and general remedies have very little direct effect. Their value is limited, as I have already indicated. If a cure is effected it must be either by the poison of the disease itself, or by something very much like it.

Late experiments, however, prove that the disease poison itself is a cure for any given disease. Several bacteriologists have demonstrated that the immune blood, or, rather, the blood of an animal containing the ptomaine of a disease, if inoculated into an animal having the disease, will cure that disease; if given to a healthy animal it will prevent the disease. A similar poison may approach this result; but the poison itself of any disease will cure the disease and also prevent it, as well as cause it.

Dr. Koch's tuberculin was a remedy of this nature. It was a partial, or is an entire failure, because it probably contains tubercle bacilli; but principally for the reason that consumption is almost an exception to pathological laws. It is not, however, an entire exception; but the time required for an acquirement of a tolerance to the poison is so long

in consumption that, as yet, we do not understand how to use the remedy. In the future all similar remedies for the treatment of the acute zymoses will be the isolated poisons of these diseases. These, like the remedies for scarlatina, pneumonia, typhoid, diphtheria, and the whole list, will be put up as remedies and used as cures and preventives. They will be absolutely successful because their use will be founded upon scientific pathology. The principle of "like cures like" in medicine will then have its triumphant success. I do not doubt that the chemists will manufacture the ptomaines by synthesis from organic compounds; or that the materia medica of the future will be made up of these special cures for special diseases; or that special diseases will be partially cured, as well as simply "treated," which is sometimes very different. Such appear to be modern pathology and modern cure; but the struggling development of medicine, which has led up to this station of science, has been attended by bitter warfare and has come up through much error and tribulation. One of the greatest difficulties in the way of medical development has been the formation of medical creeds. The organization of a body of doctrine and a body of men in anything always develops and formulates a creed. The characteristic of these creeds is that no one ventures to let his wanton thought and experiments wander outside their confines. Jenner violated the creeds of his day, as also did Pasteur, Koch, and Hahnemann.

The consequence has always been that great discoveries, whether in medicine or other sciences, have generally been made by creedless men. The germ theory and its verifications, including the modern science of pathology, immunity, and cure, is probably due more to Pasteur than to any other one man. John Tyndall worked out the science of the relation of bacteria to putrefaction, thus overturning Bastian's theory of heterogenesis. Pasteur demonstrated or verified that bacillus anthrax causes splenic fever and that a variation of type of this microbe could prevent the disease in animals. Tyndall and Pasteur were not physicians. They had no medical creed. If they had had they never would have meddled with bacteria in their day. But their discoveries, supplemented by other workers, underlie the present science of medicine. In medical development creed has always opposed creed. Out of this fact much good has been derived. "Like cures like" is one of the medical creeds; "unlike cures like" is another. These two have inevitably struggled together. The struggle has not always been limited to actual tests of merit, but politics, government, authority, religion, and all have been involved. In Europe homeopathy has made very little progress, comparatively, as a distinct organization, owing to state interference or disfavor. But in this country the organization is strong, as a result of greater medical liberty. The pretense of "regular medicine" is that all dogmas are rejected; but the meaning is that all new things are rejected.

The germ theory was ridiculed for fifteen years, while its defenders were ranked as "quacks." Electricity, hydrotherapy, massage, all were classed in their beginning as quackery. But the "grand old profession" generally ends by adopting everything. It will some day, if its morals improve, adopt all the pathies, including Christian science. It will fight the question many years, possibly, but will some day incorporate into the code of ethics a provision which will give a physician a proprietary right to his inventions relating to surgical instruments and remedies. All ethics except medical ethics now grant such privileges. There is nothing in the ten commandments, nor in the sermon on the mount, nor in the Saviour's amendments to the ethics of Moses that is designed to prevent any man from enjoying the rights and benefits of his own labor of brain or muscles—his inventions, his discoveries, his thoughts, his property. Thou shalt not covet thy neighbor's horse, cow, money, stocks, bonds, lands, wife, nor his proprietary rights that are his by inheritance, acquirement, or discovery—even including his cures for disease.

The development of pathology from the humoral to the cellular was a great stride of the human mind toward the station of scientific truth. But Virchow's idea that all life as well as disease originates in the cells was a violation of the existing creeds of that day. The old theories died hard. For some reason the human mind is extremely tenacious in its hold upon formulated opinions.

Extremes sometimes meet. The treatment of disease was empirical when homeopathy was originated and its creed formulated; heroic doses of poisonous drugs were the remedies. There is no doubt that more harm originated from the remedies than from the diseases. Hahnemann went to the other extreme, and his homeopathy, or his remedies, was truly infinitesimal. The therapeutic pendulum swung to its opposite extreme and limit.

But the blessing of this new method in medical practice was great indeed. If it did no other service it lessened the dose of poisonous remedies and gave nature's method of cure by nature's own remedies a better chance for action. The so-called dogma of "like cures like" was a medical beatitude and a divine beneficence. If early homeopathy had vagaries as alleged, it can truly be said that even "its errors leaned to virtue's side," and its mistakes were conservative in relation to human longevity.

Herbert Spencer says in substance that all error contains a kernel of truth and all truth an element of error. The proposition that "like cures like" is certainly a truth in therapeutics; but there is also some truth in the dogma that "unlike cures like." But both these cures are limited to symptoms and results. Neither method prevents the natural course and duration of a disease. I think there is no subject more interesting than the comparative study of these two principles of cure.

To explain both methods I will offer the proposition (1) that a large dose of any given drug

causes symptoms correspondingly opposite and antagonistic to a small dose of the same drug; (2) in relation to pathology, all symptoms are the resultants of physiological force antagonized by pathological force.

Now to understand these propositions I will notice blood pressure and the heart's action in disease, and the effect of remedies.

A disease poison (ptomaine) may increase the blood pressure and increase the heart's action.

This effect is a resultant of two forces—the poison and the physiological force. But every function is likewise the resultant of two opposing physiological forces. The heart's frequency, or rate, is the result of the motor energy resisted by the inhibitory energy of the nerve centres and heart. If the heart beats are too frequent in fever it is because the fever poison either stimulates or weakens the inhibitory force. Suppose now the physician wishes to lessen the frequency of the heart during fever. He may do this by giving a large poisonous dose of a drug which will weaken the motor force of the heart; or he may give a small dose of the same drug, which will strengthen the inhibitory force and thus produce the same effect. The advantage of giving the small dose is readily appreciated. It is far safer in therapeutics to stimulate than paralyze.

The general law of this action of drugs, or that a small dose of a drug has an opposite effect to a large dose of the same drug, is easily demonstrated. We know that this is true of atropia. It is also true

with the action of strychnia. A small dose of whisky is a stimulant, but a large quantity paralyzes. Small quantities of arsenic tone the stomach and increase the appetite and digestion; a large quantity causes inflammation of the stomach, vomiting, and entire loss of appetite and digestion.

This rule of drug action holds good in all drugs. A small dose of a given drug stimulates certain organs and tissues, while a large dose has an opposite effect upon the same organs and tissues.

But a further illustration of this fact occurs in pathology, particularly in malarial poisoning, or in any ptomaine poisoning. Just before a paroxysm of ague the patient will feel remarkably well. People subject to chronic malarial poisoning learn to know that an unusual feeling of health and strength with great appetite presages an attack of fever, or neuralgia, or dyspepsia, or whatever other type or form of trouble their disorder may assume.

The first effect of all ptomaine poisoning is stimulating. When the disease begins and the ptomaine in small quantity enters the circulation, the appetite, muscular strength, mental activity, and all are stimulated. The patient will volunteer the statement that he never felt so well. In a day or two the poison has increased in quantity, and now, where once was increased activity and good feeling, is illness, or the very opposite effect; both conditions being caused by the small and large doses of the same poison.

The two great creeds or dogmas of medical

practice hang upon the two extremes of drug action in the small and large doses. There is no question that there is truth and usefulness in both methods; but there is no doubt, also, that scientific cures are homeopathic in their action.

The use of tetanoxin, or the immune blood of an animal which has had tetanus, as a cure for tetanus, is homeopathic in principle. The further recent experiments with the immune blood of other diseases which have been verified by Tiggona, the Klemperers, and others all verify this fact. The principle involved in vaccination and also in all inoculation for the prevention of diseases is "like cures like." The like causes the establishment of a tolerance to the poison in the tissue cells, which is specific cure, or the cure of special diseases by special remedies.

The final step, then, in the development of medicine would appear to be the dogma of special cures for special diseases; the demonstration is that special cures, so far as known, act upon the homeopathic principle.

It must be remembered, however, that special cures are not aimed at results but at diseases. They are not symptom remedies. Curing a symptom does not cure a disease; it only antagonizes the results of disease.

CHAPTER II.

THE MODERN PROGRESS OF MEDICAL SCIENCE.

UNTIL within eighteen years the medical profession did not know the cause of disease. This fact seems incredible and is a confession that few care to make. Within that time Pasteur, Koch, Sternberg, and many other workers in the field of microscopic research have demonstrated that the microbe causes disease. Pasteur's clearest verification, perhaps, was the proof that the bacillus anthracis is the cause of anthrax, or splenic fever, in the lower animals and man. Within the same time Dr. Koch has overturned all medical theories, guesses, doctrines, and pretenses by his demonstration that bacillus tuberculosis is actually the cause of consumption and all tuberculous diseases.

The reason that the real cause of disease remained unknown for ages and centuries of medical practice was because the microbe is a microscopic plant very difficult to discover and study. But it was finally discovered. For many years after the first bacterium was actually seen no one believed that such an insignificant organism could cause disease. In fact no one had the least conception of the idea of parasitism in general or particular in relation to disease. It was known that parasitism was a bio-

logical principle, but none thought, at least the profession did not think or believe, that parasitism is the great pathological force which underlies the phenomena of disease, as essentially causative in this relation as the force of gravity is to the phenomena of astronomy. A short time previous to Dr. Koch's discovery that consumption is caused by a germ, Dr. Bastian was making some remarkable experiments with the microscope. Dr. Bastian was not working particularly as an investigator into the cause of disease, but in the general field of biology. The doctor took some beef decoction, as well as aqueous preparations of turnip, potato, and hay, which he exposed to the air until they were turning putrid, when he examined a drop of the fluid with his microscope and found it teeming with life.

Bastian's conclusion was that life springs from decay ; that in biology death is the true parent of life. His experiments seemed to prove this fact. If he made a fresh turnip infusion and examined it no life could be seen ; but in a few days, as soon as there were evidences of decay, life would appear — small in form and type, but countless in number.

This discovery of Dr. Bastian's excited not only the biological scientific world, but also the theological centers. The principle of the scientists was that life is derived from life, or like begets like ; but Bastian set up the doctrine that unlike begets like, and called this new discovery, because it was different from old theories, heterogenesis.

During the next five years the whole interested

scientific world may be said to have occupied itself in looking down the tube of the microscope at an infusion of hay or turnip. All people could go over his steps and verify Dr. Bastian's simple observations. All could see that life was the product of decay, or that a vegetable or animal decoction or infusion, as soon as it began to ferment or decay, produced life.

These living organisms of Bastian's were determined to be bacteria. People who were anxious lest their idols might be in danger argued that if it were true that decay produced living bacteria, this did not account for the origin of man or the creation of species, nor was it a general principle of the creation or origin of life. The discovery of heterogenesis was a menace to science and theology alike. The fundamental truths of each, relating to this new discovery, seemed equally in danger of destruction.

The fermentation of matter containing no nitrogen and producing such products as acetic acid, and the putrefaction of organic matter containing nitrogen were supposed to be due to chemical changes brought about by exposure to oxygen. All organic decay was supposed to be oxidation and due to the attraction of oxygen for organic bases and elements.

This doctrine is fundamental in every text book of chemistry that is over eight years old. Disease was supposed to be caused by a chemical poison generated by putrefactive decay; but if physicians observed that the specific infection of a disease ap-

peared to be multiplied in quantity as a disease or an epidemic progressed, their explanation was that disease increased the amount of the disease infection.

This was the state of medical and biological science when John Tyndall took up the subject of Bastian's doctrines and experiments. By an elaborate series of experiments Tyndall proved that the very opposite of Bastian's conclusion was true—that instead of decay, putrefaction, and fermentation being the origin of life or of living bacteria, the bacteria were the cause of putrefaction and fermentation.

Tyndall disproved Bastian's experimental errors. He showed that all organic matter exposed to the air was subject to attack and destruction by these bacterial agents, and proved further that if any organic matter, flesh or vegetable, were sealed hermetically, so that the air could not reach it, it would never putrefy or decay.

Empiricism is always in advance of scientific explanation. The fact was a very old one in practical use that the preservation of foods, vegetable or animal, was accomplished by these methods—by drying them, treating them with certain drugs, as creosote or common salt, or else by hermetically sealing them. No one could explain the reason of the success of these methods, except upon the theory that they in some manner prevented the action of oxygen. The explanation was very clear when Tyndall demonstrated that the spores or seeds of the bacteria are everywhere present in the air; that

excluding the air from any organic matter excludes the spores; that common salt, creosote, etc., used to preserve foods, are poisonous to bacteria and prevent their action; and that absence of moisture prevents germination of seeds.

Tyndall's discovery that the air is always and almost everywhere charged with these spores is scientific and poetical as well. His investigations of the sunbeam led to this discovery. He discovered that a sunbeam was caused by refraction of light by particles of organic matter and not of inorganic dust as supposed. He demonstrated that no matter how heavily the air may be charged with dust alone, no sunbeam can be produced; after which he verified that the inorganic dust of the air, which causes a sunbeam, is the spores or seeds of bacteria.

Tyndall's experiments were published serially in scientific journals as they progressed, while the scientific world followed them with most intense interest.

His experiments seemed to fulfil the prophecy that some day the least shall become the greatest. The significance of the relation of these smallest of living things to human life and death is of the greatest importance. In fact bacteria would seem to be the arbiters of human destiny, to determine the decrees of human fate. They underlie very much of the foundation of the great problems of life and disease, of death and of human science in relation to biology.

Tyndall's remarkable experiments merit more than a passing notice, in consequence of the importance of their bearing upon medical science.

The physiological products of the infectious microbe are known to cause special diseases. The physiological products of bacteria which cause disease are similar to those of bacteria which cause the putrefaction of organic matter, or matter which contains nitrogen. These products are the nitrogenous gases,— in fact, sewer gas. As these products are rapidly oxidized they are probably but a small factor in the symptoms of disease.

In a general sense these gases are poisonous, and when inhaled, if strong enough, they can cause death.

The excremental products of bacterial plants which cause fermentation are alcohol and acetic, butyric, and lactic acids; and there is also what is called a viscous fermentation. Fermentation is not limited to the bacteria; the yeast plant and certain algæ and fungi have the power of causing the phenomena of fermentation of various substances.

The phenomena of fermentation are vital and chemical. Observing the process we understand that some form of life is feeding upon the material undergoing the ferment and that the material passes through the living organism, yielding up force and substance to maintain the structure, work, and life of the organism. By chemical tests the fermented substance is found to be changed in its chemical structure. As a rule it has added oxygen. Before the discovery of bacteria all fermentation was sup-

posed for this reason to be caused by the action of oxygen.

Of course the product of fermentation, in any given case, is the excrementory product of the organism causing the ferment.

The principal known ferments are :

(1) Alcoholic fermentation of sugar.

(2) Acetic fermentation of alcohol.

(3) Lactic, butyric, and viscous fermentation of sugar.

(4) Ammoniacal fermentation of urea.

(5) Disease and putrefaction, or nitrification.

The most anciently known and cultivated type of fermentation is the changing of sugar into alcohol by the yeast plant. As thus produced alcohol is the excrementory product of this plant, along with carbonic dioxide.

The acetic acid fermentation of alcohol, or the changing of wine into vinegar, is also a process long known and utilized. So far as known the organism which thus consumes alcohol and produces vinegar is the only living creation which can live on alcohol without drunkenness. This organism is a species of bacteria, technically called, as a species, the mycoderma aceti. The genus to which it belongs is named microbacteria.

These little organisms form a thin vail upon the surface of wine or other liquid, which is smooth at first, but becomes wrinkled and is submerged with some difficulty. This vail is composed of countless numbers of these organisms.

The mycoderma aceti, if sunk beneath the surface of the wine, will still live, but it ceases to produce vinegar. The reason is that it must have oxygen, which it obtains from the air while in this surface position. When thus placed it takes the alcohol from below and the oxygen from above, producing vinegar as an excrementory product.

The lactic, butyric, and viscous fermentations are all the work of respective species of bacteria, as they act upon substances containing sugar, or as they consume these substances as food.

The typical lactic acid fermentation is witnessed in the souring of milk. It seems almost impossible to collect milk without the contained organism of the lactic ferment. The organism withstands a great amount of boiling, but certain germitoxics, as glycerine, or salicylic acid, greatly retard its development.

The ammoniacal fermentation of urea is performed by a species of bacteria, which acts upon this animal excretory product and converts it into ammonia. The organism creates disease by accidentally getting into the bladder and setting up its peculiar ferment. It is readily destroyed by rosorcin, or boracic acid. The name of the species is micrococcus urea, and it is a sphero-bacterium, seen in chains.

But the widest field of fermentation comprises the action of the virulent microbe proper, and embraces its relation upon both dead and living organic matter containing nitrogen. As a rule the alcoholic

and acid ferments do not take a poison independent of their excrementory products. But the many species of microbe which cause disease and putrefaction manufacture a poison, an alkaloid, called ptomaine. This word was taken from the Greek, meaning cadaver, and ptomaines are so called because when first discovered they were found in cadavers and were supposed to be incidental products of the decomposition of the organic tissues by the influence of oxygen.

So far as known all disease microbes live in dead organic matter. They change the matter into sewer gas. As the manufacture of ptomaines is a part of their physiology, all decaying and rotting organic matter is liable to contain these poisons. This is the reason that ice cream, canned meats, old sausage, cheese, etc., are sometimes poisonous.

The ptomaine is the weapon of the microbe. It is made as other plants make poisonous alkaloids—strychnia, quinia, atropia, hyoscyamia—and for the same purpose; for offense and defense.

The poison of the microbe answers the same end as the canine tooth, the beak, claw, and horn of animals. The microbe does not need its poison except when living on tissue cells that are alive. It first kills the cells and then consumes them, producing the definite symptoms, conditions, and pathology of disease.

As a rule the fermentative excretory products are poisonous to the organisms which produce them, although they may not be to others. The rule is

that no organism can long live exposed to its own waste products. Urea is the principal leucomaine of the waste products of animals and is a deadly poison to all living creatures. Other leucomaines of a poisonous nature are excreted by the lungs, in addition to carbonic dioxide. It was by these poisons that the great mortality was caused in the "Black Hole" of Calcutta among a company of British soldiers confined there by an Indian nabob. It is for this reason that the ventilation of houses is so essential. People are killed in unventilated rooms by slow poisoning, caused by breathing over again the respiratory leucomaines—their own waste products. The biological sanitary law is, relating to all forms of life of the animal kingdom at least, that no organism can maintain a healthy existence exposed to the poison of its own excrementory waste products. We find that this law holds good relating to the microbe.

The microbe causes cancer, consumption, the diseases of childhood, the epidemics, the blood poisoning of wounds. It causes insanity and the various degenerations of brain, liver, kidneys, and other organs. For this reason these diseases are called zymotic, the meaning of which is ferment. When the microbe successfully invades an animal it sets up the process of fermentative putrefaction. The forces of the body resist the poison, and the great resultant of these forces acting in opposition underlie pathology.

The cancer cell is the product of the reproductive

force of the tissue cell, modified by the ptomaine of a microbe. The various cells of degeneration of various tissues are produced in the same manner. If the ptomaine is too virulent, the cells are simply destroyed. If there is a semi-successful resistance, the product is a new cell and a new pathological, or histological, creation, which is unlike any tissue of the body; and this takes the place or assumes the relation of a parasite of the body.

The ferment of the microbe in the living body underlies all disease and the moral trouble of the world. It destroys life. But for the microbe there is no good reason why the average duration of life should not be extended to several hundred years.

I regard the chief cause of drunkenness, or the wide universal use of alcohol, to be due to the poisoning caused by the germ of disease and the unsanitary public putrefaction of dead organic matter.

But it is clear that we are on the eve of discoveries which will cure diseases. A cure will be found in the discovery of some single remedy which will destroy the microbe, whether out of the body, or on its surface, or within. It is certain that such a remedy is somewhere and that it can be found. I may say that I have been experimenting on this problem ever since the verification of Koch and Pasteur, which proved the question that the microbe causes disease. The question was at once clear to my mind that if disease has a single cause, which is

a living organism, a single remedy must be found which will destroy the cause of disease.

In relation to Tyndall's experiment with the sunbeam it would appear that he made conclusive proof. By "sunbeam" he meant the illuminated rays of light passing into a room through a hole in a shutter. Tyndall first experimented with this phenomenon, and learned that by holding the flame of a lamp under or directly in a portion of the sunbeam the beam would disappear within a certain radius of the flame. This led him to believe that the flame burned up the particles that caused the refraction of light, which it could not do were the refracting matter inorganic. He then made a box with glass sides, having holes at the ends through which he passed the sun's rays, creating a beam, visible in the box through the glass sides; after which he introduced meat and vegetable decoctions into the box, when he found that they fermented and that bacteria existed in the ferments. He then coated his box with glycerine, covering the end openings with glass to exclude air, and in time he could get no sunbeam in the box. The bacteria were caught by the glycerine. He afterwards, by an ingenious contrivance, introduced the meat and vegetable infusions into the box and found that they would not ferment.

His verification appeared to be that the spores of bacteria from the floating bacteria of the air cause all fermentation, and that excluding the air from fermentable matter prevents its putrefaction, because it keeps out the spores.

This was the experiment which upset the doctrine of heterogenesis suggested by Dr. Bastian. It gave a great impetus to the logical medical mind, which reasoned that if bacteria caused fermentation they may cause disease. In a few years the labors of Pasteur, Koch, and many others verified the truth of this hypothesis.

The discoveries of Dr. Koch, Louis Pasteur, John Tyndall, and their co-laborers certainly mark an epoch in the evolution of science and mental development. It is only eighteen years since medicine could lay any claim to any of the factors of an exact science. But it is not more than eight years since the science of bacteriology in relation to diseases really became the working basis of medical practice and thought. The doubt and discussion exceeded everything of the kind in the history of medicine. The demonstrations of Dr. Koch were ridiculed and professionally anathematised for five years. The creeds of the medical profession were fixed and powerful. Dogmatic pathology and dogmatism in medical practice ruled the profession. The classification of diseases was based upon symptoms, without reference to the cause of disease. Pathology gave a record of results with unlike causes as numerous as the conditions of life—the climate and all the phenomena of accident and good and evil in human environment. The causes of disease included all things in the earth and all things of mind and body. The most unlike causes were credited with similar results in the production of disease. The demon-

strations of Dr. Koch were new in medicine. Heretofore the logic relating to the cause of disease was deductive, and based on a dogma of belief in medical practice. The various organizations among the medical schools formulated their creeds from dogmatic generalities rather than from laws discovered from the verification of facts relating to the cause of disease. They did not know the cause of disease. Dr. Koch's demonstrated discoveries made a science of medicine possible. It made sanitation a science. It taught the mutual relations of living things to each other in the problem of life and death. It taught that parasitism is the great biological principle which underlies disease, or that parasitism is the fundamental force of pathology.

The discovery by Charles Darwin of the law of natural selection and its application to the origin of species was an induction which overturned many creeds in science and greatly advanced the human mind in methods of thought. But the discovery, although it develops the public mind, has not the element of practical benefit that is given by the verification that parasitism underlies disease. No discovery has ever been made that is of so great benefit to the human race. The knowledge it gives means, eventually, the prevention and cure of all diseases and a great lengthening of the average duration of human life. To live well and to be able to answer the question, "Is life worth living?" a man must live long. His diseases must be destroyed and the heredity of old age be far removed from its

present standard in relation to time. This discovery makes it a certainty that human death, aside from accident, need be only from old age and that the source of the greatest sorrow of the world will be supplanted by euthanasia.

No one to-day, thinking over these facts, but will express surprise that the medical profession had no science in medical practice, nor knew the cause of disease until within so short a time, and that it should have delayed so long in its acceptance. The first question can be answered satisfactorily by the fact that the discovery of disease ranks all other discoveries in scientific and vital importance; therefore, in accordance with the laws of mental evolution, it could not have been made earlier. The slow acceptance of the discovery depends upon the fact that formulated creeds and beliefs in the mind are most difficult to displace, even by a demonstration. I give these as general facts or principles, putting out of the problem the personal equation of professional envy and jealousy.

Dr. Koch in future years will be given full credit for the greatest discovery in medicine. He will rank in medical science as Bacon now does in general science and in relation to inductive logic. History will take away the personal equation of contemporary workers and inventors and preserve only the great general principle that Koch discovered. History will never bear the record of the criticism of the medical press which for several years was burdened with this kind of literature.

To-day there are only a few old fossils left who do not accept the germ theory of disease. These gentlemen are too old to learn new things and their brains are not plastic enough to dismiss old creeds. They will die in their doubts and be forgotten.

It is now about thirty-five years since the medical profession discovered, or rather admitted, that the zymotic or preventable diseases terminate after a specific duration by natural laws. The disease terminates in recovery or death, with or without treatment. This law holds good with such diseases as small-pox, scarlet fever, typhoid, and like diseases. This was once called "spontaneous termination," but wrongfully so, for there is no such thing as "spontaneous" in nature; that is, there is no phenomenon in nature which is not the offspring of other phenomena. One might as well talk about the spontaneous origin of species, or the spontaneous origin of disease.

Before the discoveries of Dr. Koch no one could explain what caused disease, or what determined its phenomena, duration, and termination. All that could be said was that, by the law of disease, typhoid fever has a definite duration in time and then ends. Of course this explains nothing. The statement that the phenomena of disease are uniform in character, by natural law, gives no idea of the underlying force which determines the uniformity of the law.

But Koch's discovery, with the aid of Charles Darwin's great doctrine in biology, natural selection,

permits to be given complete scientific explanations of the cause of disease, its course, duration, and the cause of the termination. These things rank medicine among the exact sciences.

The suggestion that disease terminates spontaneously and without reference to medical treatment was opposed in the most violent manner by the medical profession. They asked the pertinent question, "If disease ends spontaneously, then where is the benefit of treatment or cure?" Before this time physicians were supposed to cure disease. After this great confession physicians claimed to treat disease, but not to cure it. How could they cure it? They could not remove the cause, for they knew not the cause. They could not be credited with causing termination of the disease by a cure, for the disease would end whether treated or not, or whether cured or not. It is true that the verification of the germ origin of disease has thrown very little light on the subject of curing disease. The microbe evaded discovery until the mid-day of science and seems able yet to evade its enemies. But its discovery has made the prevention of disease a certainty. The microbe can be prevented from transportation, and from germination in soil, air, water, and organic matter. The general public, however, are not yet ready to do this work. They do not appreciate its importance or their privileges. No doubt the time will come when the preventable diseases will be prevented and the necessity of cure will be superseded.

In reading medical history we find that the formula for treating all new things is expressed by the familiar epigram, "First endure, then pity, then embrace." It may safely be said that nothing was ever discovered relating to the cause of disease, its treatment, or its pathology that was not subjected to this formula. The discovery of the anæsthetic properties of ether and chloroform and the anæsthesia of patients was opposed by the profession. Ovariotomy was denounced as a method of manslaughter by the medical press of Germany, not longer than a quarter of a century ago; to-day the least valiant of surgeons will undertake a laparotomy with general approval. The use of electricity as a means of treatment was ridiculed and denounced. The treatment of disease by hydrotherapy was denounced as quackery by the profession. Now no physician considers himself equipped for the treatment of disease without the possession of expensive electro-medical apparatus. The medical profession has a few choice expletives which are held in position and thrown like javelins at all new appearances on the medical horizon. The members first throw the weapon and an investigation is made afterward. Following this generally comes the "embrace," or the acceptance of the verified discoveries.

The two great principles learned as a result of the verification of the cause of disease are, first, that diseases of like character do not have a variety of unlike causes; and, second, the cure of any disease is not accomplished by a variety of general

and unlike remedies. A remedy which can reach and entirely destroy the microbe of disease will cure a disease. When such discovery is made it is found that a single remedy is a cure. There is no longer a call for a great number and various kinds of remedies. The cause of each special disease is always a specific cause. The cure is a specific cure—a single remedy; or else there is no cure, the disease being simply treated by a variety of general remedies, which may or may not antagonize some of the general symptoms of the disease, and may do good or injury. The latest results of medical investigations have demonstrated single and positive cures for tetanus and pneumonia, and have indicated the general principle upon which positive cures will be founded.

CHAPTER III.

OXYGEN, OZONE, AND BACTERIA.

NO dead organic matter is oxidized without putrefaction. Dead plants and animals, with the dead waste of plants and animals, would lie where they fell forever were there no agents for their decomposition but ozone and oxygen.

These substances are first consumed by bacteria; dead bodies in graves, dead plants on the ground, dead sewage and leaves, as well as all waste of living things are consumed by bacteria. Oxygen is necessary to complete this process, just as oxygen is necessary to maintain life; but oxygen does not do the work. Bacteria form from dead matter the fetid gases, the sulphites, nitrites, phosphites, acids, gases, water, etc., as well as ammonia and such compounds.

It is not known that oxygen anywhere does this work without bacteria. The latter are also the agents of fermentation. All ferments are bacteria,—acetic acid, vinegar, alcoholic ferment, and all others. This process of fermentation was supposed to be all done by oxygen, until the demonstration of an English physician eighteen years ago. The work of bacteria, on dead and living matter, results

in what we know as disease, putrefaction, and fermentation. Putrefaction is the result of the action of bacteria on dead matter which contains nitrogen. When bacteria act upon dead matter which does not contain nitrogen the result is fermentation. When bacteria act on living matter the result is disease.

So far as known all diseases are caused by some kind of poison. Some diseases, as consumption, scarlet fever, pneumonia, typhoid, etc., are caused by the poison of bacteria. These poisons are generically called ptomaines. The law is that each species of microbe has its specific ptomaine and causes its special disease. The microbe acts upon living tissue cells by means of its poison; it kills the cells by poisoning them and uses the dead cells for food. In disease the microbe inhabits the tissues which offer the least resistance and manufactures its ptomaine, killing the cells of this particular tissue. This produces the phenomenon of disease. In all such cases of disease more or less of the ptomaine poison is taken up by the circulation and poisons the general system. This poison, so circulating, causes fever, by acting upon the nerve centres in the medulla oblongata. So true is this now known to be, that a rise of the bodily temperature is a certain indication of the presence of a ptomaine; no other poison causes rise of the temperature. Alcohol lowers the temperature; so do aconite, atropia, arsenic, etc.

Of course the products of putrefaction are oxidized in the air; the process of oxidation is then

completed. But all dead matter is broken down mechanically and chemically by these forms of life before oxygen plays any direct part in the process.

Moisture is necessary in all this operation, because bacteria cannot live without water. Fruit, meat, food, etc., are preserved by canning, putting up in antiseptics, or drying. The canning of such materials mechanically keeps out the bacteria; antiseptics destroy them; drying the food prevents the germination of the spores of the bacteria. Wheat sown in a field will never germinate if water is not present.

Ozone is one of the germ destroyers—germitoxic, antiseptic. It will kill a germ, just as enough of it will destroy any living thing. Like all other germitoxics it can be used to a limited extent in the body as a germ destroyer, with more or less success, and yet not destroy life. The rule is that all poison, or any poison, which can destroy bacteria, will also destroy tissue cells, although this may not go far enough to take the life of the person.

Nature cures disease by creating a cure as a result of disease.

Immunity to the action of any disease poison is the inevitable result of poisoning, as it is to any disease,—provided the patient lives. The tissue cells acquire a tolerance to the poison through being poisoned. It is this law of poisoning which causes the termination of diseases and the termination of epidemics. By this law the optimist foretells a millennium of health and the end of disease.

No other final result can occur under the present laws of disease.

It is true enough that oxygen can affect dead organic substances to a limited extent, without the preliminary action of bacteria; but owing to the universal presence of bacteria, oxygen seldom or never actually does this work.

Bacteria are the agents of nitrification. If they did not exist, life in this world would soon end for want of nitrogen, or nitrogenized organic matter. Suppose, by way of illustration, that the nitrogenized materials, living and dead on earth, weigh five million pounds ; say half of it is dead and half alive ; the living half is continually dying and the dead continually being made alive. The manner of making the dead alive is by first feeding plants ; then by feeding the plants to animals, and the latter to other animals. But living things die and living things continually manufacture waste products. The dead bodies and the waste of living bodies take the nitrogenous materials under the ground, or into the water. Oxygen cannot reach dead bodies, but the latter are reached by bacteria. They are consumed and washed away by water, or pass into the air, or are taken up by plants.

The waste of animals is used as a fertilizer ; but plants feed on such material in its natural condition with great difficulty. In fact plants do not use manure or sewage until they rot ; rotting simply means the liberation or mechanical pulling apart of the chemical structure of the waste products.

The action of bacteria puts the material into chemical relation with oxygen. Nitrites, nitrates, phosphites, phosphates, etc., are created, and these materials are first taken up by plants and then by animals.

Now suppose bacteria were out of the problem. Dead bodies would lie where they fell, forever. Dead trees would lie prostrate, while bodies in graves that were dry would preserve every feature until the resurrection. Dead waste would cumber the ground and streams, but would be waste forever. None of this nitrogenous material could be again taken up. In a longer or shorter time life would close for want of food ; all organic matter would be dead and buried, with the nitrogen under lock and key.

Bacteria ferment, putrefy, and cause disease. They ferment organic matter which does not contain nitrogen, putrefy that which does, and cause disease in living matter.

In this day "the least has become the greatest." Our destinies and fate were long bound up in a wise Providence ; but it seems that the work designed by Providence is carried out by bacteria.

Ozone is manufactured, to a limited extent only, by the process of putrefaction. It is nature's disinfectant. It impedes the overdevelopment or overgrowth of the putrefactive forces, but of course it does not prevent all putrefaction. Putrefaction is the resultant of the forces of bacteria, resisted by ozone. Ozone, however, as thus manufactured,

begins the process of the oxidation of the putrefactive products.

That bacteria cause disease by making a poison generically called ptomaine appears to be verified. The law also is that each species makes a special kind of poison, But an interesting question is here developed. Why do different germs attack different parts of the body? Bacillus tuberculosis, for instance, attacks the glands—the lungs, as a rule. Why should cholera bacillus assail the intestines? Why typhoid bacillus the glands of Peyer in the intestines? Why other germs, as small-pox, the skin?

The question is explained by Darwin's law of natural selection. The animal kingdom has been fighting the ptomaine poisons always. Little by little, one at a time, the cells, tissues, and organs have become exempt from the action of these poisons. If there were no such exemption, thus acquired by heredity, any given ptomaine of any germ would affect equally all parts of the body. Scarlet fever poison would do so, typhoid would do so, as also consumption, diphtheria, etc. In such a case we should have no definite diseases; all would be alike. As it now is, the problem of disease is a resultant of the acquired resistance which any tissue may have, as one force, and the chemical force of a ptomaine on the other side. Tissues or cells acquire a tolerance to a poison by being poisoned. It is my belief that no cure will ever be found for the ptomaine diseases; though there will be for all other poisons.

All cure for these diseases is prevention—to use an "Irishism." When cells have acquired a tolerance to a ptomaine they hold it for some time. It is this fact which makes the prevention of disease possible. Now disease of any special kind can only be prevented by the poison which causes the disease. If this poison can be tempered, so as to be used safely, a tolerance is acquired, which tolerance exceeds the power of the microbe with its ptomaine. This is the philosophy of all inoculation for the prevention of diseases.

Killing the microbe is the next method. This is an extremely difficult thing to do, because poisons are not specific enough. The law of natural selection holds as good with bacteria as with people. Bacteria can acquire a tolerance to poison. There is no doubt that the surgical microbe will in time acquire a great tolerance to carbolic acid, corrosive sublimate, and such antiseptics. If the bacillus tuberculosis is poisoned for a few years with ozone, the germ will acquire a tolerance to this drug. This world is based on a war footing, and all living things have equal privileges and powers under the great law of natural selection. But man is the product of this warfare. So are the bacteria. They are now fighting each other with the same general weapon — poison.

The law of natural selection explains how diseases come to an end. The plague and black death were once the chief epidemics ; they ceased because the people of Europe acquired a tolerance to the

poison. These epidemics no longer prevail. Cholera is no longer so virulent and yellow fever is no longer so uniformly fatal. La grippe will wear out the same way. Syphilis is now very mild and no longer takes off the skin or destroys the bones of its victims.

Sanitation has its effects on all diseases. Proper sanitation could entirely banish them. It is no doubt intended by Final Design that all such diseases shall be destroyed—not by cures, but by prevention. "An ounce of prevention is worth a pound of cure."

Our antiseptics do injury to germs no doubt, when applied directly, but really, the philosophy of cure, as I have said, is prevention, by using ptomaines.

There are several hundred poisons which destroy bacteria. If it should be developed that each species has a specific poison which it can not resist at all, and this poison is one which the human being can resist, then the solution would be easy; but experience has not yet developed any such fact. Besides, if it had, we cannot avoid the law of selection; we must infer that if it were true, the germ would soon acquire a tolerance to the poison.

CHAPTER IV.

IMMUNITY FROM POISONS AND DISEASES.

THERE is no subject of popular knowledge more easily or generally understood than is the fact that one attack of certain diseases gives a person immunity from further attacks of the same disease for a greater or less period of time.

The law is that one attack of a disease has this effect as one of its results. It is said that the universe is governed by law, but this is scarcely true. It is, rather, that the universe is governed by force, or energy; law is simply an indication of the uniformity of the action of this energy in all its transformations and conservations. It is a law that ripened fruit falls to the ground; it is a law that avalanches slide down the sides of mountains, and a law that rivers flow toward an outlet of less altitude than their origin; but the forces which underlie these phenomena must be known in order to understand them.

When men explain things and phenomena they do so by citing a more general force, law, or phenomenon, under which the special thing in question can be classed. There is no other explanation possible, because the human mind cannot comprehend absolute things; it understands only the relations

between things. We say anything is explained if we know its causal relations to a general force which brings about this special phenomenon or thing, and a class of things and phenomena which are like it.

When men observe a uniform appearance of certain phenomena and do not know, or think they do not know, the underlying forces, they have no further explanation to offer than that such is the law.

At the present time, in the mind of many, there is no explanation of the observed fact that one attack of disease prevents further attacks, for a time, of the same disease, other than that such is one of the laws of disease.

Pathologists are now working out this problem. They know what causes disease. They are testing the microbe in its relations to poison, to disease, and to its natural history, in order to discover some general law which will explain certain uniform phenomena or laws of poisoning and of disease.

It is due to given workers in this field to say that they have made some suggestions in this direction which fall short of an explanation. Certain tissue cells, phagocytes, have been credited with a scavenger action in resisting the microbe. It has been suggested that animal tissues contain an element which when consumed as food by the microbe, its germ dies from starvation. Some gentlemen have suggested that oxygen is the agent which, by its presence or absence in the body, determines the duration of disease and its sequent immunity. None

of these suggestions fill the demand for an explanation. They are not known to really have an existence; but the latter is hypothecated, in the hope that it may explain certain laws that may prove their existence.

There are many leading laws of disease and poisoning which must be explained by one general law. We cannot have or invent a general law for every special fact in disease, or other phenomena in other sciences. There is no need, because a new fact is discovered, of searching for new general biological laws by which to explain it until a test is made of those already known.

The leading laws, or results of laws, of disease and of poisoning which present themselves to all observers for explanation are, perhaps, as follows:

(1) The heredity of disease and hereditary immunity from disease.

(2) The duration of disease and cause of its termination.

(3) The differentiated character of diseases; definite signs, symptoms, anatomical changes, location, and duration of diseases.

(4) The immunity from disease acquired by once having a disease, or from inoculation, and the loss of this immunity by atavism.

(5) Poisons: (a) The results of poisoning; (b) death; (c) variation in type of the cells with sequent increased tolerance to the poison, and the demand of the poisoned tissues for more poison; (d) the meaning of increased tolerance to poison; (e)

hereditary relations; (f) immunity from poisons, its extent and loss by atavism.

Disease has long enjoyed the credit of being hereditary. A perverted interpretation of the Scripture text has been applied to disease, which refers to the sins of parents. To a very limited extent the germ of disease may be claimed to be transmitted by heredity. It is possible that it may be handed down directly from the mother to the unborn child. The verification is not yet determined that the direct transmission from the father to the offspring occurs, although this may be among the possibilities. But in this heredity the cause and not the disease itself is inherited. Poisons of any kind taken by the mother may poison her offspring in this manner. A child may be born an inebriate if the mother habitually uses alcohol during gestation.

But disease itself is not transmitted by heredity. By this is here meant the pathological resultants of the cause of disease, ptomaines, resisted by the physiological forces. These resultants are, in a general sense, inflammation, pathological new formations, and degenerations.

Tubercles, cancer, and the deformities resulting from injuries are not transmitted by heredity. Amputations and scars are not transmitted, neither are fractured bones, nor other deformities caused by injury. Other poisons than ptomaines cause anatomical changes which are not transmitted. Alcohol causes a pathological variation of tissue cells—a wound, or traumatism, known as inebriety,

which is not transmitted. Inebriety is not hereditary.

The limited duration of disease is one of its definite characters. All people now know this fact. Diseases do not terminate "spontaneously," but all of them have definite laws relating to their duration and termination; this definite duration, if the disease have no "complications," is modified very little by treatment, if it is a mycotic or a germ disease. Disease terminates by natural laws, and the reason it ends is simply because the system acquires a tolerance to the poison of the disease. It is the same reason, also, which causes the future immunity of the person to further attacks of the same disease.

Diseases are not all alike, nor are they differentiated relating to signs, symptoms, and anatomy. Small-pox, scarlet fever, measles, and their like attack the skin, each causing a characteristic eruption. Inflammations of different character have different locations. Thus there is an inflammation of varying type, for each bodily organ, which is limited to each respectively. The germ appears to be unable to attack but one organ, while all other organs seem able to resist it. This law holds good with every disease relating to location. Disease appears to be definite as to place, because all organs except the diseased one have acquired an immunity from the given malady, or an inherited tolerance to the poison of the disease. A study of disease will show that one of its results is the physiological variation of the tissue cells which enables them to

resist or tolerate given poisons. This acquirement is brought about by use, or physiological activity. This variation becomes an anatomical feature of the tissue cell. It is not pathological anatomy, but physiological anatomy; that is, it is not a resultant of pathology but of physiology. It is a development and not a result of traumatism or an injury. It is an acquirement of physiological activities. It is a property of the tissues. It is immunity, tolerance, resistance. It is not like an amputation, but, rather, like the large muscle of the blacksmith.

Tooth, beak, claw, speed, strategy, and fighting ability are all the resultants of conflicts of the animal kingdom with enemies and conditions in the struggle for life. During their development, from use of the physiological activities of the struggle, many teeth were lost, claws broken, beaks fractured, and animals killed by fighting, or over-exertion in trying to outrun their enemies; yet none of these results were transmitted by heredity.

Nature carefully forgets the pathological resultants, the amputations, tubercles, lost teeth, and broken bones, but as carefully preserves all that is possible of the acquired resistance to the cause of these things, transmitting all that may be of this acquired resistance. The law is that nature does not hand down disease, but transmits by heredity the acquired resistance to disease, or an immunity to disease. It is this transmitted immunity which, in every disease, preserves many bodily organs

while others are diseased, and thus give disease its definite characters.

Immunity from disease means that nature, in any given case of illness, or germ poisoning, creates a tolerance to the action of the poison of the germ in the tissue cells of the organs diseased. This tolerance terminates the disease, and gives protection for a time, or until a sufficient degree of the variation underlying the tolerance is lost. The greater part is usually lost by atavistic variation of the cells ; but some of it is retained and some of it is transmitted by heredity.

Inoculation, in general terms, does not differ from the action of the disease. The special difference between inoculation and an attack of disease, in the usual manner of contagion or infection, is that the former brings about the disease in a milder form by a less virulent type of the same microbe. The virus used in inoculation is composed of bacteria which have undergone, through the deprivations of "culture," such hardships that they are not able to produce a severe type of disease. An inoculated disease resembles the original disease in general character, but is of less duration, and there is much less virulence, less pathology, and less poisoning. The design of inoculation, or vaccination, is to exchange the severe type of a disease for a mild type of the same disease, for the sake of the immunity which follows. Inoculation protects people and animals from disease. It is not positively safe, but the death rate is much less than when it is

not practiced, in any given disease which can be prevented in this way.

The reason that one attack of disease or inoculation will prevent disease is due to the increased tolerance of the tissues or cell structure to the ptomaine or poison of the disease.

But as is well known this protection or tolerance does not last long. It always fades away. This is the result of atavistic variation. When the cells are placed in a position where poison is a factor of their environment they must either be destroyed or undergo a variation enabling them to tolerate the poison. Then the poison is withdrawn, the cells are in a new environment; and, as this is like that which existed before the poison was present, the cells go back to their original corresponding type, or the type of their ancestors, which is atavism.

Inoculation will have a notable future. In fact it will be by this method that all germ diseases will be cured and prevented. The ptomaines of the germs of these diseases will be isolated and used as medicines. The use of these poisons will create a tolerance to the germ of the disease. The dose can be so graduated that there will be no danger. There is proof already that this can be done successfully.

The vegetable and animal poisons are similar in a general way to the action of the germ poisons. They do not produce as definite diseases, because they are not manufactured in the body by germs, but are taken accidentally, when they cause certain

definite symptoms of poisoning. Or they are taken habitually, when they are subject to the same phenomena, relating to the creation of tolerance and immunity, that control the action of germ poisons. Taken in sufficient quantity poisons cause immediate death by inhibiting the action of organs which can resist them the least. The narcotic poisons, as opium, belladonna, etc., paralyze certain nerve centres. The science of toxicology is a very interesting study and underlies therapeutic science. Diseases are treated by poisons in small doses, or in doses which are too small to cause a fatal effect. The most interesting feature of poisoning is the physiological antagonism of certain poisons to each other. This effect of poisons depends upon the physiological fact that all functions of the organs of the body are the resultants of opposing forces. There is no physiological result that is not created in this manner. Every organ and special function has its nerve centres of motion and inhibition, and the function of each organ is the product of its nerve motor force, resisted by its nerve centre inhibitory force. The pulse rate, the secretion of gastric juice, each excretion or secretion of the body, the blood pressure, and even the exercise of the mental functions are all the resultants of direct motor energy, resisted by inhibitory energy.

The antagonism of poison, physiologically, is due to the complex action of different poisons upon the motor and inhibitory energies. One drug may stimulate motor energy, another paralyze motor

energy directly. The poison which stimulates the motor energy of any special organ directly increases its special function; a drug which paralyzes its motor energy lessens its function directly. These two drugs are antagonistic.

A drug which stimulates the inhibitory energy of an organ indirectly decreases the function of any special organ; a drug which paralyzes the inhibitory energy of an organ increases the function of any special organ indirectly. These two drugs are antagonistic physiologically. The reason different drugs thus act upon different centres, organs, and functions is not because they have any affinity for certain tissues respectively; it is because different drugs meet with unequal resistance. The law governing poisoning is similar to the law governing the direction of all force; which is that all force or any force takes the direction of least resistance.

In any kind of poisoning that can become habitual two interesting factors are noticed, which are recognized laws of poisoning and which require explanation. One of them is the increased tolerance of the tissues that are poisoned to the drug; the other, a demand of the poisoned tissues for more of the drug.

This fact is observed and demonstrated in the habitues of opium, alcohol, arsenic, hasheesh, ether, chloral, and other drugs. The general force which underlies all the phenomena of poisoning must explain these two notable factors.

In poisoning an increased tolerance may not be

sufficient to prevent the taking of a fatal dose; to this extent the immunity from poisons differs from that of disease. In disease the dose of poison is limited to the resistant powers of the microbe; but, for example, in alcoholism the dose is limited only by the purchasing power of the inebriate and his ability to swallow poison. In disease the created immunity is sufficient to prevent the disease; but in opium or other poisoning the tolerance, though it may be increased a hundred fold, results only in requiring a corresponding increase of the dose to cause the same effect.

The hereditary effects of mineral and narcotic poisons are similar to those of disease. If a child swallows lye a cicatrix is formed in the esophagus. This cicatrix is the pathological result of the poison. But the scar will not be transmitted by heredity, should the poisoned individual become the parent of children. The pathological resultant is never transmitted; but in order to resist it a physiological change in the anatomy of the esophagus may result, and there is no reason why more or less of this acquirement may not be transmitted.

In alcohol poisoning the variation of the type of cells causing inebriety is likewise a wound or traumatism, which cannot be transmitted. Drunkenness is not hereditary; but the tolerance to alcohol is a subject of hereditary forces. The resistance of the tissues to the action of the poison is transmitted more or less.

Nearly all drugs used as medicines are poisons.

In the use of these drugs the laws of increased tolerance and demand for the drug are always observed. To meet this indication physicians administer their doses in increasing quantities, that they may maintain the needed physiological effects.

This gives an outline of the principal laws of poisoning and of disease in relation to poisons. To explain them some general law, or force rather, must be discerned which explains them all. It will not answer to infer this general force from diseases alone, or from microbe reactions alone, or from any class of poisons alone. As disease is a type of poisoning the same general law of force which explains the definite character of small-pox, its duration and sequent immunity, must also explain the poisoning of alcohol, the sequent inebriety, the periodical drunkenness, the term of sobriety, the tolerance to alcohol, and the demand of the tissues for the poison or the inebriate's craving for liquor. The same law must explain immunity from disease and the sequent loss of that immunity as well.

The meaning of natural selection is that through certain biological forces nature selects the fittest to survive. The fittest are not necessarily those who are the most excellent persons in the world from any dogmatic standpoint, or our estimate of humanity physically, mentally, or morally. But they are those who have those physical, mental, and moral powers of variation, adjustment, and adaptation which enable them to meet all conditions of environ-

ment and to maintain the adjustment or correspondence between their inner relations of mind and body to outer relations existing between things and phenomena.

Those who succeed in earning or getting a living, in escaping their enemies, in conquering the vicissitudes of environment relating to climate, station, diseases, etc. are they who are the fittest to live, so far as these relations extend. These laws, of course, include all vegetable and animal life.

There is no known organism having life, which is not, so far as known, subject to the laws of natural selection. So far as known every living organism from the cells of protoplasm to man himself are alike subject to these laws. The factors of natural selection are general biological laws. They relate to all life—to all phenomena of nutrition, reproduction, and special and general functions. The cells of the tissues are independent, or distinct creations, or individuals. Animal and man are simply aggregations of differentiated cells. The individual cell of any tissue, if other things are equal, undergoes the same actions and reactions as does the whole man, when subject to poison, or food, or enemies. These actions relate in every instance to the functions of each and to the integrity of structure and the maintenance of life and death. The cells and men lose their lives from the same causes. They have the same resources for variation of type, adaptation to changes in the environment, and when disturbed by untoward force they react alike along

the lines of special and general functions—nutrition, reproduction, and variation of type.

If two men are equally exposed to a given disease and one escapes, it is due to the fact that he has an immunity relating to this disease, acquired either directly or by heredity. If two tissue cells of the body are equally exposed to a poison and one escapes the result, it is due to the same reason. When a man is attacked by a disease and some of his organs escape the resultant pathology, it is because these organs through variation, and heredity resulting from poisoning, have acquired an immunity to this disease. The factors of natural selection are variation, heredity, and atavism. By variation is meant the structural and physical changes undergone by any living organism as a result of changes in its environment or internal relations. A change of climate always demands a corresponding variation relating to the physiology of the individual. The taking of a non-fatal dose of poison demands a variation on the part of the cells. Both variations are the result of outer relative conditions and both result in a closer adaptation; or, at least, it is an effort to adapt the life of the organism to changed conditions. If the resources for variation are great enough on the part of a cell to enable it under the action of poison to acquire the form, type, and molecular physiology to resist it, then the poison can have no effect; the cell lives on and for a time enjoys an immunity from this particular poison.

If natural selection is a true force of biology, it follows that its factors must explain the phenomena of life as vividly and with as satisfactory scientific accuracy as gravitation does the phenomena of astronomy. If it fails to do so, then it is not a verified or true general biological force. It will be seen that it can and does fully explain the phenomena of disease, poisoning, and immunity.

Under the force of variation tissue cells, subject to poison, undergo a change which enables them to resist the poison. When they have so adapted themselves to this condition, or the presence of a poison, they are said to have an immunity to the action of this poison.

In disease the action of this factor of natural selection tends to preserve the adaptation of the cells, but does not transmit the pathology; it transmits the variation which resists the poison of disease. The meaning of heredity in disease is that a non-resistance is transmitted by heredity, under a factor of heredity that like produces like. The reason that the children of consumptives and inebriates may have the same disease is because their families have not yet acquired by variation and heredity a sufficient resistance to the respective poisons of these diseases.

It does not follow, however, that any man in order to save his progeny should "catch" the consumption, or become an inebriate. This is nature's method of preventing these things; but man, by

reason of brains, has discovered a better means than natural selection—in hygiene or prevention of all diseases, including inebriety.

I have indicated the great laws of disease; their definite characters in type, duration, and termination. It will be seen that variation and heredity explain these phenomena. The cells gain immunity by being poisoned. They acquire a resistance to the poison, which is transmitted to the succeeding generations of cells, and, when sufficient, the cells can overcome the disease, which therefore ends.

The definiteness of disease, or the fact that in each disease certain organs are exempt, depends upon the fact that variation and heredity, acting through a long line of ancestry, have given certain organs of the body immunity. In other words, it is not to be supposed that all bodily organs have equal resources of variation, relating to disease poisons. Some of them acquire immunity before others; but until this immunity becomes general and complete the definiteness of disease will be apparently the same. The logical conclusion of these data we find to be true. When all organs are exempt the disease must correspondingly disappear; when all organs of all people are immune to any given disease, the disease must disappear altogether. This fact is observed in the nearly complete suppression of the great European epidemics, the plague and the black death, as has been said before.

The obverse proof of this fact is seen in the pathology of la grippe. No organ seems to be

exempt from this germ. It attacks the brain, causing acute inflammation or insanity, as well as the lungs, liver, heart, intestines, kidneys, and all other organs. La grippe is the most indefinite disease at present known in relation to pathological lesions, location, duration, and symptoms. The only reason is because the disease is new. Nature has not had sufficient time to cause, by variation and heredity, an immunity relating to the disease and various organs of the body. Like other diseases la grippe must now have its day. Unless prevented by brains engaged in sanitary work it will appear with periodical intervals of activity and rest, until all organs and people are immune to the ptomaine of its germ, when it will disappear altogether. Such are the law and the method of natural selection relating to disease.

I have stated a law of disease to be that it may be directly transmitted from the mother during gestation, but this is not heredity. It is not heredity if a child, born or unborn, has a disease communicated to it by either parent. This is the direct communication of disease; the heredity of natural selection means the transmission of physiological likeness, subject to physiological and not pathological variations.

The variation of tissue cells under the action of poison cannot be denied. All living organs, cells, and animals possess their power of variation in relation to environment. A change of environment in any particular necessitates a change in the organism

to meet new conditions. Unless the organism can adapt itself or be adapted to this change it cannot survive. Those which have resources to meet the demands of adaptation are they whom nature selects to survive.

The adaptation of new conditions is an effort of physiology. In disease the pathology indicates a failure to survive, of certain tissues and cells. They are conquered; they no longer multiply their kind. A hybrid cell is created, the resultant of physiological forces resisting the poison of disease. So far as nature and physiology are concerned these hybrid pathological cells are not recognized. They are no more a part of life and of heredity than a graveyard is a part of the business of a civilized community. To be sure these hybrid tissues draw nutriment from the blood current as parasites; a graveyard is sustained financially by the business of a community; but neither nature nor men recognize either of these pathological results as factors of the business institutions of the living animal or community.

I am aware that one of the old verified doctrines of heredity was that the pathological cells send representatives of "physiological units" to the germ cells concerned in reproduction. This cannot be true. These cells are parasites. They can no more enter the physiological currents of heredity than other parasites. An itch insect occupies the human animal tissues. It causes traumatism and a pathology. But the insect is not transmitted

by heredity, nor is its pathology transmitted. The reason is that neither of them are physiological variations of the tissue cells, acquired by use or disuse, and therefore they do not enter the current of hereditary transmission. That which is transmitted in disease is simply a weak resistance to the poison of disease. When an immunity to poison is acquired, this is transmitted, because it is a physiological acquirement which, when transmitted, secures general immunity to this disease.

It is easy indeed to observe these same laws of natural selection in operation in the physiological action of the vegetable and mineral poisons. All observers know that when any given poison is taken habitually the result is inevitably an increased tolerance or immunity to the poison, with a demand on the part of the cells for a continuance of the poison or inebriety.

Under the law of variation or adaptation the cells acquire most remarkable powers of toleration ; inebriates of opium, alcohol, arsenic, and other drugs take enormous quantities of these poisons.

The demand of the poisoned cells for poison is explained by the same law of adaptation. No variation of any organism is free from difficulty, though the remote results may be in every way beneficial. When an alcoholic inebriate enters upon a debauch he drinks generally to unconsciousness. The reason is that the poisoning of the cells is painful and their necessary suspension of the usual physiology and labors to resist the alcohol are painful. Alco-

hol is an anæsthetic, and if more is drank during the debauch the pain of poisoning is thereby lessened. For this reason the inebriate drinks himself into coma, anæsthesia, paralysis, and, sometimes, death. But there is another factor to this problem. During a prolonged debauch from any poison the demand for the poison seems imperative. This is due to the distress of atavistic variation of nerve centres, tissues, and cells. If the poison is omitted there is a new condition of environment; a new adaptation must follow on the part of the poisoned tissues. As this new condition is like that which existed before the poison was taken, this new adaptation and variation is called atavism, or a reversal to the type of the ancestor or ancestral conditions. In all types of inebriety this change is difficult and in some inebriates it is almost impossible. It makes no difference that the remote effects and conditions may be in every way beneficial.

In poisoning and disease a similar law controls certain phenomena. Immunity from disease acquired by having the disease, or by inoculation or vaccination, is lost again. When an inebriate reforms and is cured, in time he loses a great part of his tolerance to his favorite poisons; if he resumes his inebriety he must begin again with a comparatively small dose.

These facts are explained by that factor of natural selection called atavism, the meaning of which is, a reversal to former conditions. Atavism is nothing different from variation or adaptation. It

indicates only the direction of the variation. When disease poison is removed, or other poison is not taken, the poisoned cells are placed in a new environment; hence they gradually lose their immunity and tolerance to these poisons.

CHAPTER V.

SOCIAL RELATIONS OF POISONS AND THEIR CURE.

I CLAIM that poison is the underlying evil of human life—the Mephistopheles of society. It is the foundation of moral evil and the cause of death ; it is to blame for the low average duration of human life ; it entails endless and multiple sorrow, and, indirectly, superinduces poverty. Poison was the serpent of Eden ; the bone of the tempter's fang was a literal chemical poison, as an antitype of the evils of life; and when the human race passed out of the gate under the flaming sword it entered the arena with disease, debauchery, crimes, and premature death, because the Satan of poison must be overcome by sacrifice, by atonement, by faith, and by the evolution of science.

In each million of human beings we find one centenarian ; so say the statistics. The meaning of this is that one person in every million has the power of resisting the influence of poisons for one hundred years. This man or woman may have had many diseases—may have used poisons as a dissipation and lived in a poisoned air, fed on adulterated food and yet have come through them all and reached the grand centennial of human life. But

now special sense is failing ; hearing and sight are weak and uncertain. The brain is shrunken nearly one-third in actual weight ; its plastic or receptive qualities are nearly gone. Thought is no longer created in his mind, but when a spark of consciousness is aroused it turns about, and, nudging memory, the two ransack the catacombs of the old man's mind for the buried ideas and memories of the past. Old age lives on its own youth, according to the law of nature. Youth and mid-life have made the property, and during this period the mind is built up; the centenarian eats the bread of his working-day providence, and his mind is also the product of his industrial age. Things of yesterday with him are trifles. Happenings of fifty years ago are the mountains of his memory, that rise clad in green verdure from the stony desert of the present. Nations in their rise, decay, and fall exhibit the same types and forms. These things I think present the greatest questions that are of interest in human study. The two great questions are, how does one man or one woman in a million succeed in resisting the poisons of death for one hundred years, and why does he necessarily grow old and die from old age?

The study of one of the poisons, or alcoholism, has led me to think much on the subject of poisons in general, with their general effects upon the people in their physical as well as ultimate moral results. The study of poisons would appear to be the key to an understanding of human life. The failure

to live long is due to poisons. The decay of the organism of life and the inevitable heritage of old age, with its degeneration, are closely associated with the results of poison. The latter is a stimulus to the forces of life which is paid for in human sacrifice. It is a tariff of youth which is balanced by the penalty of early death and the decrepitude of age. A study of poisons, disease poisons and alcohol, will show us the general laws of poisoning relating to the acquiring of the power to resist them for a few years or many years, and will further show this relation as to the causes of the failure of life from what is called old age, and, incidentally, the relation of poisons to moral evil.

All people know the ordinary diseases caused by poisons—the poisons of the microbe. They are the diseases of children, as scarlatina, diphtheria, etc., and those of later life, as consumption, typhoid, pneumonia, and many others. These diseases destroy life; they cause poverty by their expenses. They mutilate, deform, and often permanently destroy the earning powers of many people by reason of their dire physical or mental results. They lead also to intemperance, for the reason that there is no one remedy so universally used in these diseases as alcohol. The latter cannot be used as a remedy, or in any other manner, without causing a proportionate disease of inebriety.

But we observe now a great conservative law of nature. This is that one attack of disease prevents future attacks of the same disease. At least this is

the law, with the usual limitations that go with all such universal rules. We learn, also, that this power of resistance, given by one attack of disease or one case of the action of poisoning, has more or less permanence, and has greater or less hereditary force. We find, likewise, that, whatever deformity the disease may cause or however permanent the deformity may be in the individual, it has no hereditary force whatever. A child may have deafness or blindness, from disease of these respective organs, as a result of scarlet fever; but these deformities are not hereditary. The little increment, however, of immunity gained by the child is hereditary. If it were true that disease is hereditary, the deafness and blindness caused by these diseases would have made the people of Europe deaf and blind generations ago. But the tolerance to poisons, or the immunity given from disease created by the poison of disease, is hereditary. If disease were hereditary, humanity would be a crippled deformity. The reason this world is still inhabited, having civilization and free institutions, is because of the immunity given by heredity, under the law that one attack of disease prevents future attacks of the same disease. This law is a part of organic nature and a thought of great Final Design.

There is no such thing as the heredity of disease. People who hold the contrary of this do not know what disease is, nor the laws of heredity. They do not think what the results would be if disease were hereditary, directly as well as indirectly. In

heredity it is true that people cannot inherit what their ancestors do not have ; if their ancestors have only a very weak tolerance to disease poison, the children must inherit this weak tolerance. It appears that in relation to many diseases the human race was created, or was descended, with no immunity; although it is well known that some of the diseases of the lower animals have no power over the human organism. The emancipation of the human race from sin, moral evil, poverty, crimes, diseases and poisonings, so far as nature is concerned, lies in the fact that disease is not hereditary; while the tolerance created by having diseases is a property of heredity.

There is no type of poisoning that does not correspond to these laws. Old alcoholized nations consume immense quantities of the drug, per capita, with corresponding inebriety ; but the actual fatalities decrease in proportionate ratio to the generations and to the tolerance gained. This is nature's way of preventing intemperance; or, rather, the results of poisoning. When alcohol is first supplied to a nation, not used to drink, the result is fatal in proportion to the amount furnished and drank. The Polynesians are now dying off under these circumstances. If any African tribe were supplied with beer, as the German or English nation is now, the tribe would soon be a relic of history. The saving clause of alcoholic license is that a tolerance to alcohol is created in each nation, somewhat in proportion to its increasing facilities for manufacture,

general distribution, and consumption. The tolerance to the poisonous action is hereditary. The children of old families, whose ancestry were the bottle heroes of the dinner table, are drinkers ; but inebriety among them is not so pronounced. They can tolerate more alcohol with less poisonous effects. It does not follow that in order to save his progeny a man should become an inebriate, or have all diseases. Nature's method is too slow, and science has one much superior to it. It is well to cure inebriety and practice sanitation in relation to other diseases ; but if people, as individuals or nations, will not use their brains in relation to these things, there is no other name given for this physical salvation from poisons than the heredity of an acquired tolerance to the action of these causes of destruction. Disease is horrible and loathsome. Through its evil agency the nobility and strength of manhood, the beauty, the loveliness, the grace of womanhood, the beloved charms of childhood lose their strength and beauty and are only the poisoned ruins of humanity. The most pitiful manifestations of mind are the delusions of fever ; the most horrible disguise of the human face is the eruption or the emaciation of disease. The most horrible thing to contemplate is the slow poisoning and gradual consumption of the vital organs of a human being by the parasites of disease. Poverty, slavery, exile, and the oppression of victorious armies, the famines, wars, and martyrdoms of the world are peaceful smiles on the roseate face of humanity as

compared with the deep lines of agony made by the ravages of poison. Debauchery from alcohol pictures the worst type of humanity in its fallen condition. In a few hours the proud protector of a family, mayhap the peer of the very noblest of the earth in station, position, learning, and success, lies low in the semblance of death. Consciousness and volition are gone. Thought is dead. The wretched stupor of alcoholic coma has the brain in its grasp; where once the proud intellect directed thought there is now a deluge of poison; alcohol has filled the valley and covers even the highlands of the mind and soul. But the deluge recedes and finally a shamed consciousness bearing a palm leaf flies to the window of the frail ark of life. The mind is restored to the agony of remorse, and sickened desire, which has outridden the storm of poison, like Noah of old seeks the dry land of reason and sense, only to plant another vine. The craving for drink is hidden in the fruit of that poison vine. It is the craving for drink which follows the drunkard's debauch, as the track of the serpent follows his journey over the flowers of Eden. The craving for drink is the pain, the sting, and the living consciousness of inebriety. The craving is the knight-errant of King Alcohol, seated on a horse and armed with a spear and shield. The knight may preach a chivalrous devotion to the relief of a suffering soul; but we know that until his shield is broken, his lance splintered, and he is unhorsed, King Alcohol will

rule that soul as never tyrant or despot ruled his people.

The records of the courts tell us that inebriety underlies crime. Inebriety is insanity, and the insane are the criminals. Inebriety is improvident and wastes the earnings; is improvident and does not earn. The wages of the industrious are taxed to punish the victims of alcohol with fine and imprisonment, for crimes done while the victim is drunk and mentally and morally irresponsible. The violently insane were formerly punished with the lash, or bound and thrown into dungeons. Cruelty was the earliest born of ignorance and poison. The little hereditary increment of tolerance to poison, which has fallen like the dews from heaven over the generations, has taught men at last that the divinity of mercy is a child of the human mind and the product of the imposed necessity to which the human race is subject in working out its own salvation from poisons.

Grief is the handmaid of poison. I wonder some old master did not give us this picture of poison—a heroic skeleton, armed with his emblematic cross-bones, and accompanied by the sable-clad and weeping figure of sorrow, as they walk to and fro in the earth. From the very footprints of this strolling pair spring the giants of social and moral evils. Lives are ruined and minds are wrecked by grief. The sorrow of Rachel mourning for her babes echoes from the mountains and hills of history back to the

brains and hearts of humanity, and calls for emancipation from disease and poison. Poison strangles the babe even in the mother's arms. It enters the homes, and in the name of disease or debauchery slays the hero of happiness and makes a slave of the heroine to sorrow. There is no sorrow like that which waits upon early death. Throughout the world of mind it is a pall which covers supreme effort and constant endeavor and shades the human heart from the sunlight of happiness.

The continued existence of the centenarian is a curiosity and his death is expected. His business is arranged, his labors ended. Grief long ago grew tired of him and went on her busy way; the loving and reverent hearts which are bound to his personality are ready to say, "Thy will be done," and not be broken. The centenarian gradually lets go of the threads of life. His consciousness is fading into the nirvana of the soul, and the cradle of his old age is rocked by the tender hand of euthanasia.

People curiously ask why it is that one person in a million can live to be a centenarian? If one can live so long, why not all of us? The curious gatherer of statistics makes a visit and asks questions, trying to learn the secret of long life; for long life is supposed to be due to some single thing of mind, conscience, or diet or drink. The queries and answers on these occasions are always amusing if not instructive; but nature eludes such investigations after the secret of long life. I have seen many publications of interviews with old people,

who told of their customs and habits of life; but each case seemed to have a secret of its own and no two were alike.

There is a secret, however, to long life. For centuries and generations nature has been at work on every living cell of vegetable and animal life, slowly reconstructing and fortifying them against poison. The work is like taking a fair country and building forts along the rivers and walls about the cities, to keep off invading armies. People will not build defenses until they feel the enemy; nature acts in the same manner. When the poison comes nature begins to build defenses. Each animal cell gains an increment of tolerance with each invasion of poison. This reconstruction is, part of it certainly, transmitted by heredity. In time the results begin to appear—diseases die out and people live longer. During the passing of generations, by this process we get the history of decaying epidemics and the phenomenon of the decrepit centenarian, who is a curiosity because he has outlived his day. But why do people grow old in appearance and constitution as well as years? Why should not a human life renew itself with perennial vigor, and hand in hand with the centuries journey along, wearing the crown of earthly immortality? What mistake of creation, or misstep of evolution, has determined the average duration of human life to be thirty-five years, and that only one in a million shall live to be one hundred years old? In old age the bones grow brittle, the muscles

wither, the brain shrinks, the face wrinkles, the functions are feeble, and the withered old man with the mind of a child sinks down into the earth whence he came, as one wraps the mantle of his couch about him and seeks a dreamless rest. In some manner all living things inherit the tendency to grow old and die. The inanimate creation exhibits an analogous action. The great mountains are beaten by storms and drops of rain; the ground granite of their mighty forms is dissolved and scattered as loam in the valleys and washed into the bottom of the sea. No doubt the planets and even the suns have their duration of life and their time to change. Stars that were shining suns have been seen to blaze with surprising glory and disappear forever. There is an eternal round of change of matter from nebulæ to planet and sun. The organic material which is bound into the forms and types of life lives and dies over and over again. One day an organic tissue may form the grass and flower of the field, the next day it is the food of the market, and the next it may occupy as tissue the human brain, to engage in a new invention or plan a new campaign of political economics. But I believe that if destiny does transmit the necessity of death to all living things, still human life is too short, and I think the cause is poison. By this I mean that neither one hundred nor several hundred years should cause the physical degeneration of age as we see it now.

The only way of explanation is that life is short-

ened by poisoning. I have likened the changes in the cells of the tissues caused by poisoning and the variation of type which gives the cell its resistance to poison, to that which a country undergoes to enable it to resist an invading army. In place of fields of grain are battlefields with entrenchments, forts, and the various types and forms of defense. The energy of the country is diverted from directions more conducive to long life to those of labor and expense in building works and institutions that are of no use except in war. War is not beneficial; it is not development; it is sinful and morally debasing. Thousands are slain; the country remains poor; its culture, wealth, and ethics linger along the way of growth and increase. In time energy becomes exhausted, and perhaps a premature death of the nation and government follows.

The same law holds good in poisoning. When poison is taken it necessitates a building of defenses. Every tissue cell of the body, feeling poison, calls its resources into action and begins to build defenses. Each tissue cell is filled with fortifications and defenses built at its own expense. The defenses may be sufficient to protect from the enemy, but the expenditure of energy and the great waste of accumulations lessen the duration of life of the cell and make it prematurely withered and old. It is aged before its day and its early decay is due to the fight, an exhausting fight with the great arch enemy of life—poison. Like tissue and cell, like man. I do not think that the early decay of human organs and

types is hereditary as a direct result of hereditary forces, but as an indirect result of the waste of energy in fighting poisons.

Forts, towers, and battlements deface the fair features of the landscape. On the face of a civilized country the institutions of war are a deformity. In the human being the scars of injury and the deformities of tissues caused by the battlements erected to resist poison, disfigure the fair type of life and deform the beauty of nature's high conception of the beautiful, the good, and the true.

The victim of alcohol is prematurely old. His decrepitude and shrunken tissues may be hidden by the horrible bloating or congestion of his flesh, and poison may color this deception with an imitation of the tinge of health ; but when the poison is taken away we see the body shrink to its true proportions. The withered muscles have the shrunken form of age. The face of the youth and middle-aged will show the time-furrows of the octogenarian. Digestion is feeble, and until nature has time to do the work of rebuilding the cured inebriate he will look like the stooping and attenuated victim of many years. We need no better example or proof of the causes of so-called old age. It is not old age. The centenarian is young in years ; the years have not beaten him down. The winters have housed and fed him, the springs of the year have invited him to walk among the buds of beauty and the resurrection of life, the summers have given him the harvests, and the autumns have garnered his grains and his wealth.

Why should seasons and their years make him old? He is not old; he is poisoned. Disease has eaten his roots of life and his defenses have taken away their soil to build entrenchments.

The inebriate is a type of poisoned organism which has wasted its energy in the defense of poison. The tissues are made insane by debauch and, like terrified animals in a conflagration, seek to escape danger by rushing back into the flames. The inebriate in a debauch will take drink after drink in obedience to his craving, until coma and paralysis have bound his brain and limbs with the appearance of death. When the debauch is ended his body is consumed and wasted, the tissues which are not dead are burdened with overwork, and the degradation of deformity waits upon his restoration to activity and life.

Diseases are not cured. By this I mean the diseases and poisonings of the microbe. Drugs may mischievously antagonize the saving symptoms, which are only true sisters of mercy clad in the white and black vesture of the nurse; but drugs do not cure these diseases. The diseases are cured when the tissues of the body have acquired a tolerance to the poison of disease. Then the disease comes to an end, the microbe dies and ceases its manufacture of poison. If the microbe could increase its poison as the distillery can, then no disease would have an ending. No tolerance can overcome the liberty of drinking and the poisoning of alcohol. But inebriety is curable. The craving

yields to cure. The disease is more readily curable than any other type of poisoning. The desire for alcohol that rises above the will and sense and judgment, as the great mountain stands above the foothills and the rugged plain, is subdued and the disease gives way to health ; rational thought and self-control resume their place in the conduct of the regenerated inebriate.

All ethical philosophy points to the final moral perfection of humanity. The forces of heredity sustain the logic of philosophy. It is believed that selfishness will die like a disease and the true divinity of altruism guide the moral conduct of men. But this day and result are impossible until poison is eradicated as a factor of human life. There is no possible moral perfection, in the brain that is perverted by poison in its structure, thought, and conduct. The emancipation of humanity from the slavery of crimes, debauchery, insanity, and disease hinges upon the banishment of poisons, when moral perfection will follow the resulting greatly increased duration of human life.

CHAPTER VI.

INFLUENCE OF THE MIND IN HEALTH AND DISEASE.

THE mind, acting under conscious direction or automatically, gives bias to the conduct and labor of all species of the animal kingdom in their methods of gaining a living. We find in the lower types of animal life, therefore, sensation, special sense, consciousness, will, and intellect. The human mind is built up by evolution from these fundamental factors as they exist in the lower types of life. The great action of the mind over the body, then, in health, so far as evidence of mind can be traced in the lower animals, is to enable the individual, or species or genera, to so adjust itself to its environment as to earn or secure its living or maintain successfully the "struggle for existence." The adaptation of any living being, having mental powers, to its surrounding circumstances is made by mental adjustments of simple or more complex character, and the mind, acting through the nerves and in no other manner, secures as far as possible the work required.

This action of mind in health is directed externally, or upon external objects. It is the action of the mind through the body, to enable the individual to acquire the means of living.

The mind in health has powerful influence over the physiological functions of the body. It can avert digestion, cause heart failure, paralyze the muscles, destroy sensation, or stop the functions of the special senses. It can increase, on the other hand, all these functions, as well as cause perversions of their action. It can excite the auditory nerve and hear sounds that do not prevail; it can pervert the vision and see objects which never existed. It can exalt sensation, or prevent it, so that objects are felt which have being only in the imagination. Mental and bodily influences are mutual. Bodily diseases, as those of the brain, nerves, or other organs, cause insanity. The retention in the body of leucomaines—the poisons made by the body itself — can cause mental diseases, as melancholia, mania, and even complete disruption of all mental faculties. The fact is that the mutual relations of body and mind appear to be so finely adjusted and mentally dependent that any disorder of body will cause coresponding mental perturbation, while any mental disorder will cause relative bodily disease.

These general propositions give the outline of the mental and bodily relations, as these relations operate in connection with the outside world in the business of life, in getting a living and in the maintenance of life, in health and disease; also as mental influence is exerted over the functions and physiology of the body.

But we must now look at the subject from a more special standpoint. The question will be asked,

what is mind and how does it act upon the external world and upon the body? We want to know how the mind acts, and if there is a limit to its action; if it is bound and limited by any conditions.

In the study of what mind is, the great problem is approached from two opposite standpoints. One opinion is that mind is a spirit, or an entity, which exists independently of organized or living matter. The other is that it is a force, and the product in each case of the individual bodily energies of physiology. The first of these goes so far as to claim that all matter is mind; the second asserts that all mind is matter.

These opinions originate from the necessary conception by the human mind of the world and universe, bound as this is by the fact that human knowledge is relative and not absolute. We understand only the relations between things and phenomena; we do not know the actual or absolute qualities of anything. We only comprehend the relations of likeness and unlikeness between things and phenomena. With this understanding of the limited power of the human intellect we realize that one part of the universe is unknowable to us, and the other part we may know if we will. We grasp the relations between things and phenomena, but we do not know the reality of things and phenomena, or their absolute qualities.

The unknowable world is supernature, and we are in the habit of designating our classified necessary ignorance of this subject as supernaturalism.

The world that we do know is called nature; our knowledge of the accurate relations of the phenomena of nature is called science. We may infer, then, from these facts that we will never know any more than we now do about the absolute qualities of either mind or matter. In the study of any questions relating to either we are compelled to limit our investigations to the methods of science as they relate to the phenomena of nature. The phenomena of nature which are knowable to us—the forms and physical qualities of matter, organic and inorganic, and the manifestations of force, physical or vital — are recognized as manifestations of the unknown absolute. Electricity, light, heat, chemical force, magnetic force, together with mind and all of the physiological forces, as well as all the physical phenomena of nature, we recognize as manifestations of a "fundamental verity" or "absoluteness," of which we know nothing except its works.

We know mind only by its relations to other things and forces. We cannot therefore say what mind is absolutely. We have no language except that of science to express what is meant by it. To say that mind is a self-existent entity explains nothing, for we do not know what a self-existent entity is. We only know the manifestations of mind as they are expressed through the nerves, or are reacted upon by the same agents. We have no method of defining life in scientific terms except to say that it is the maintenance of certain conditions that exist be-

tween the relations of external things and the physiological or internal relations. We cannot define mind except in the same terms and language.

The next great question is, how does the mind exert an influence over the bodily functions and conditions in health and disease?

The farther back one goes in the history of philosophies the more theoretical supernaturalism he will find in the attempt to explain the method of the action of mind in relation to life and living things. The first great idea of this character asserts that the Supreme Power simply said in effect, let all things be created, and they were at once brought into existence, supernaturally, without nature. This was the original conception of the human mind in its infancy. But a knowledge of the methods of nature has displaced this fundamental idea and has seemed to prove that the Absolute works by a method, which method we know as nature. An old conception of nature was that no phenomenon occurred that was not a special order of supernatural power; but admitting this, we are also obliged to admit that nature is governed by law or by uniformity of action. I do not deny any tenet of supernaturalism nor any one of the doctrines of any of the ten great religions. The point I wish to bring out clearly is that no manifestation of mind can be understood or explained except in terms of science; any which we can be cognizant of that cannot be explained in these terms is not known to be a revelation of the action

of mind. It is true, also, that many mental manifestations, notably mind reading and hypnotism, so far as these things are not mistakes or fraudulent pretensions, are explicable in terms of science and are in accordance with the known laws of nature.

People communicate with each other mentally, by language or its equivalent. Yet there is no end of literature which endeavors to prove that all manner of communication between individuals, even through great distances, has been effected by some unknown and mysterious method. There is no proof of any such mental action. If such were possible, cases enough have been reported to reveal the physical law of force or nature which underlies such action. It is now acknowledged that the leading modern spiritualistic phenomena of history were all deceptions. In all scientific questions the moral factor has great importance. Truthfulness and accuracy are very essential factors in the observation of all phenomena.

Premonitions are next in importance to supernatural long distance mental communications. With many persons it is a habit to have them. Imagination is unlimited through the space of human experience. An unoccupied mind will employ itself in revery, which consists of calling upon past experiences and applying them to the future. It would be strange indeed if some vain imaginings did not include possible future occurrences. It is the habit of some people to indulge these imaginings as to every possible condition of their future; then if any

calamity occurs they will claim that their imagination of it was a premonition. So few of these premonitions come to pass that no law of mental action can be made of them. But if this were a law, what calamities might be averted. If it were so, no calamity in fact could occur. All people would be forewarned and forearmed.

Belief is the harlequin of the mind. It is no possible criterion of truth, because belief in error or fact depends on corresponding information, or evidence, or education. Besides this, prejudice and self-interest are the old masters which always give color to belief. Belief is an index showing not only a person's mental development and training, education and culture, but also the whole hereditary history of the individual relating to mental development. Belief indicates opinion. As a rule any person believes in his own opinion, but all people are in intellectual error who regard their belief alone as any sufficient or correct guide to intellectual or moral conduct. The only verification of truth or fact in relation to the human mind is demonstrative, mathematical, or experimental proof.

No mental faculty has hindered mental and social progress as belief has done. The tendency of the human mind is to have beliefs firmly fixed in the mind. As a result old beliefs are like hereditary diseases. They become a part of the brain and are transmitted by heredity. It is therefore impossible for many people to change their belief. In fact there is a noticeable pride with the general-

ity of mankind in maintaining their beliefs in spite of new information and evidence. It is not considered quite honorable to change belief in politics, religion, morals, or medicine, or in any creed whatever of faith or science. It is a sign of a healthy and well acting brain, body, and mind if belief adapts itself to every new verified fact that the mind may acquire. Belief formulates creeds in science and supernaturalism, and nourishes and maintains them. Belief and creed are like an iron railing, inclosing human thought and human conduct, which is unyielding and unchanging until it rusts away; but human conduct and belief should depend, instead, upon information and positive facts; it should be as flexible and changeable as is human belief and conduct in business, when the information is derived from the machine which writes information on a tape indicator.

A modern school of pseudo-science has arisen whose doctrinal theory is that a belief, even an affected belief, relating to any phenomenon of the body, or of external origin, will determine its truth and correctness. In fact this intangible and incomprehensible theory asserts it is sufficient to cure a disease, if its existence is denied or not believed in, and, even, that all external and internal phenomena depend for their actuality upon human belief.

Such is the logical outcome of the culture and inheritance of unchanging belief, despite the verifications of science or the non-conformance of the

belief to the intellect in all relations of matter and mind.

The human mind has fathomed the universe scientifically and determined its own limits of understanding and comprehension. Acting through natural and understood laws and natural methods it has made the desert and wild surface of the world a paradise of human civilization. This work was not done by hypnotism, magic, belief, or by any other supernatural or superscientific method ; it was done by human mind acting through nerves and muscles and performing work.

The influence of the mind over the body in health and disease can now be understood, as we have derived the general principle of mental action from the instances given of the methods and influence of the mind upon external objects and phenomena. We know of no supernatural action of mind. There is no phenomenon of mental action upon the organs of physiology which cannot be explained in terms of natural science ; so we will find that alleged supernatural mental activities and results are either deceptions or delusions of the intellect by a dominant belief.

The mind has connection with the body through the medium of the nerves. It acts upon the body by no other method, by nerves and psycho-motor force. We understand the general character of the nervous action to be sensory, motor, and trophic or nutritive. The nerves of special sense are sensory nerves, which convey special kinds of sensation to

the brain, where it is interpreted in a special manner or as a specialized form of sensation. We know very well that the mind directing the body at work uses sensory and motor nerves. The mind receives information through the nerves of general and special sensation and acts through the nerves of motion. The mind, also, without doubt, has more or less influence over the functions of the trophic nerves. This is the outline of the influence of the mind over the body in health.

So far as the mind is concerned we may classify all diseases as those which are caused by the mind and those having other causes. A healthy mind never produces a disease. A diseased mind may produce bodily disease to a limited extent, directly. A diseased mind may also cause bodily disease indirectly through self poisoning, flagellation, starvation, and suicide even.

In direct action the mind may cause loss of motion, or local or general paralysis. It may cause loss of sensation, general or local. It may possibly, acting through the trophic nerves, cause local or general emaciation, or atrophy, or hypertrophy.

Further than this the mind can cause no disease, directly; indirectly there is no question that the mind may, to a small or limited extent, weaken the acquired resistance of the body to the action of germ poisons. During the progress of any disease the mind may, through the influence of the motor or sensory nerves, weaken the power of digestion and assimilation of food, and be a factor

of great injury in the prevention of the recovery of the patient.

Further than this the diseases caused by the mind are instances of self deception, or matters that exist only in belief. The diseased mind refuses, or is unable, to dismiss belief in the existence of disease. Belief may dominate the mind in this relation just as it may in any other relation. If a man believes he has heart disease of valvular origin, he will conduct himself accordingly so long as he believes it. But his mind cannot cause the heart disease. A man may believe that his right hand is made of glass and will guard that member accordingly, for fear of breaking it. To him his hand is glass ; but his hand is flesh and bone, in fact. He is deceived by his mental harlequin—belief.

As will be seen the greater number of diseases caused by the mind are imaginary diseases. In fact, strictly analyzed, all of them are. The man who believes his hand is glass does not move it, and no doubt the sensation of his hand to him is like glass. This is the influence of the mind over the sensory and motor nerves.

People who have these imaginary diseases will, unconsciously perhaps, imitate all the symptoms of the disease with which they are acquainted. If a person believes he has consumption he will cough ; if he believes he has paralysis he will not walk, or will go lame ; if he believes he has lost his voice he will whisper. Yet the existence of these symptoms will not produce the actual disease ; they will pro-

duce an imitation of the disease. But the general public takes very little interest in the relation of mind to disease ; the reason being that the public interest is so great in the relation of mind to cure. The influence of the mind in curing disease is limited to its influence in causing disease. It can cure no real malady, but it can cure the imaginary disease. Any disorder of the mind or body which can be caused by a belief can be cured by a change of belief. It is true that mental influence is an important factor in the cure of disease, for the reason that a belief in recovery tends to stimulate the sensory and motor nerves, holds up the powers of digestion and assimilation, and maintains the action of the heart. Belief can cause death during the progress of any disease, or, even, without disease, by bringing about heart failure. Belief can do a great deal to prevent heart failure during the progress of disease.

There is no more dangerous faculty of mind than a stubborn belief, in an ignorant or, even, an educated mind. In such a condition the patient's life may be unnecessarily lost. It is this stubborn, ignorant belief which directly has slain thousands and millions for opinion's sake. The faggot fires of history illuminate a hideous spectre—the ignorant belief of superstition. The errors of science, the mistakes of medicine, the dogmas of faith, the slow development of the cure of diseases, the persecution of the insane, and the present punishment of inebriety as a vice instead of its recognition as a dis-

ease meriting a proper treatment are the results of ignorant belief.

The diseases of the second class, or which are not the result of mental influence, are those caused by microbes, by poisoning, and by mechanical accidental violence to the tissues of the body. To illustrate clearly the curative power of the mind in these diseases I will take up, first, the injuries. However great may be any person's belief in the curative properties of the mind in germ diseases and in diseases caused by poisons, this belief does not seem to include the cure of broken bones. Chronic lameness from some obscure disease, however, comes within the scope of faith. It sometimes occurs that crutches are carried longer than necessary after an injury, from habit, or a belief that they cannot be dispensed with. In such cases some prescription of faith may change the belief and the crutches will be thrown away. The belief caused the disease and a change of belief causes the cure. But belief does not always succeed. People who have real diseases and deformities and use crutches, seeing this evidence of mental cure, will try it. Their belief being already fixed when they comply with the simple requirement of mental cure, they will throw away their crutches and rejoice with the others ; they will declare themselves cured, leap for joy, and walk without aid. But in such cases the cure is apparent, not real. The ability to walk without crutches is due to the fact that the mind, directed by belief, has benumbed the nerves of sensation of

the diseased part; the patient for a time walks without pain, but eventually resumes his crutches.

The influence of the mind in all germ diseases, as cancer, consumption, typhoid, the diseases of childhood, and, in fact, all others of this character, is limited to the effects I have stated. Mental bias is a great help in aiding the physiological forces during the progress of disease. It makes no difference from what source the belief is derived, whether faith in sarsaparilla, an Indian doctor, the prayer of faith, or a candid acknowledgment that belief alone destroys disease, the effect will be the same. Hope, faith, belief, will stimulate the vital functions and help to resist the disease. In diseases which terminate after a certain duration of time any influence whatever which stimulates the vital forces is a very useful adjunct to the treatment. It is true that the physician endeavors to secure the confidence of his patient. He knows by so doing his remedies will have a powerful helper in the belief of the patient.

But diseases which terminate fatally are treated by belief and always with the result of verifying these limited results of mental action. In obscure diseases, as hidden cancers, consumption, and other infectious diseases of internal organs the pain may be the only symptom known to the patient except resulting weakness. If a belief in a cure in such cases is established the pain will cease, because the mind, influenced by dominant belief, will refuse to recognize the message of the sensory nerves. As a result the patient declares himself cured, and will

endeavor to act as long as possible in accordance with his belief, although the disease is not influenced in the least.

Inebriety is a disease belonging to the classification I have given under the head of poisons. No hereditary, or other disease, or mental influence can produce this disease directly. It can only be caused by a poison. Any reason in the world may lead a man to drink, but nothing other than alcohol can cause inebriety.

Until within a few years no treatment except mind cure has ever been tried for inebriety. Those who regarded inebriety as a sin prescribed religion; those esteeming it a social vice have enjoined pledge signing; those who consider it a crime pronounce the sentence of fine or imprisonment. All of these methods have had more or less success. The inebriate may refrain from drinking because he fears punishment, or believes some mental influence has cured him, or because his pledge stimulates his will to abstain; but none of these things can cure the disease. The mental influences simply dull the sensation of craving for liquor, which is the symptom of the disease. The disease remains the same, and when the mental influence, from any cause, grows less powerful the disease will again assert itself. The only cure for inebriety is medical treatment.

CHAPTER VII.

SEROTHERAPY, AND NATURAL SELECTION IN RELATION TO IMMUNITY FROM DISEASE.

THE most interesting social problem is the prevention of disease. In fact there is no social question of greater importance. All matters that relate to earning a living are of secondary interest to that of early death by disease. The average duration of human life underlies social progress, the present civilization, and the hope of a greater. There is no force of higher influence underlying a long average duration of human life than the agent of mycotic disease or its poison. Poison is truly the bane of human existence; it underlies moral evil; it is the real foundation of poverty; it is the well-spring of human sorrow; it is the agent of early death. A force which underlies these social phenomena is not exceeded in importance by any other known evil, and, therefore, there is not a more interesting problem to the human soul and mind than the question of the prevention of poisoning, or the prevention of disease.

Out of the fact that one attack of a disease gives immunity for a longer or shorter period from attacks of the same disease has grown the practice of inoculation for the prevention of disease. Vaccina-

tion for the prevention of smallpox is a method of inoculation. The general principle involved in this plan of acquiring an immunity is that a mild attack of a disease will give a corresponding protection from the disease, and inoculation causes a mild attack of any disease so caused. The "virus" used in all inoculation is a modified type of the microbe causing the disease; the modification consists in the fact that the virus is a microbe having less power of manufacturing the characteristic poison than the original disease germ.

The cause of disease is a very simple affair, now that it is fully understood. The occult feature, much of the mystery, and a great part of the dignity of medicine and medical practice have always depended upon the unknown factors of disease and the empiricism of cure. To know that poison is the cause of disease and that the action of poison is by chemical force acting upon the tissue cells, causing increased cell activity, perverted cell activity, and paralysis of cell action, as well as variation in the type of the cells, is to simplify the nature of disease and bring the subject within the domain of science.

Both inference and observation verify the doctrine of the germ theory. The logic of the phenomena of disease is also a proof. That the cause of disease multiplies itself in the body of a diseased person is a fact long verified ; this phenomenon can be explained upon no other hypothesis than that of the germ origin of disease. The discovery of

the bacteria and their classification, the demonstration of their power in the manufacture of poisons, and the verification that these poisons can cause disease complete the logical, demonstrative, and experimental proof of the cause and the nature of disease.

The germ of disease, the microbe, enters the system through air, food, by contact, or through a wound. The law governing the various species, which represent so many species of disease, appears to be that under equal exposure all persons are liable to disease inversely as their acquired force of resistance.

The force of resistance, or the degree of immunity and its nature, requires explanation. It is a matter of common observation that in an epidemic not all people, under the same exposure, will be equally diseased, and many escape altogether. Another fact of observation is that one attack of a disease, or an inoculation of its modified type, gives immunity, for a longer or shorter period, to the same disease.

The meaning of immunity in any degree from any disease means that the tissue cells have acquired and hold the power of resisting the poison of disease. This immunity can be acquired in no other manner or method by the cells except through being subjected to the action of the poison. The resistance of the cell to the action of the poison creates a variation in the type of the cell, which variation is characterized by an increased power of

resisting the poison, or of resisting a greater amount of any given poison.

Observation teaches us that the more of any given poison a person may take the more he can tolerate, within certain limits. The habitues of alcohol, opium, chloral, arsenic, and all other poisons used in this manner confirm this fact.

Immunity from disease is made up of the following factors: The virulence of the microbe, its invasive power, or its poisoning power. The power acquired by the tissue cells of tolerating or resisting the poison of the microbe exceeds the microbe's power of invasion. For this reason the increased resistance of the tissue cells and their nuclei is sufficient to prevent the disease or the invasion of the microbe.

This is apparently and logically the philosophy of immunity from disease acquired by the process of nature and under the law of the relation of poisons to life, disease, and death. The methods employed by sanitation are inoculation of the germ or its poison—an imitation of the method of nature ; a destruction of the germ, or prevention of its transportation through air and water ; and other methods which interfere with the multiplication and diffusion of the virulent bacteria.

Serotherapy is a new term used to explain a new variety of inoculation designed to prevent disease by causing an immunity. The method of using serum in this manner is to take the blood of an animal during a disease or following a disease, and,

letting the serum of the blood separate under antiseptic precautions, inoculate the serum into the blood of another animal.

It is learned during these experiments that other tissues and fluids of the body have this immune property, as it is called. The saliva exerts a great resistance to the invasive power of many diseases. It was learned by an experimenter in this field, who was making cultures of the microbe of influenza or la grippe (which microbe can be cultured only in a culture fluid containing blood), that the blood of this culture fluid, or the serum of the blood, would prevent the invasive power of the germ, and would, when inoculated in the blood of an animal having the disease, also cure the disease. The serum of the blood of patients who have had cholera, if injected into the blood of guinea pigs, will protect them from cholera. In diphtheria and tetanus the serum of the blood of persons so diseased will protect, and even cure, these diseases in animals. In fact experiments prove that this law of serotherapy holds good in tetanus, diphtheria, anthrax, cholera, typhoid fever, and influenza. There is no question that it will hold good in all germ diseases in which the tissues can acquire a tolerance to the poison of the disease and that in the future such is to be the treatment for all such diseases, including surgical infections, the diseases of the lying-in chamber, and the diseases of childhood.

The fact has been demonstrated that the isolated cultures of the microbe containing ptomaine poisons,

as well as the isolated poisons themselves, are capable of causing an immunity from disease. From the known laws of poisoning there can be no reason to doubt the proposition that it is the poison of the germ alone, whether in culture fluid or blood serum, which has the power of causing the immunity.

Various writers on the subject of serotherapy have presented various theories to account for the immune power of the animal fluids which have been subjected to disease.

These suggestions are that the serum or fluids must act in one of four ways: (1) they may possess a bactericidal property which enables them to destroy the offending germs; (2) they may have an attenuating effect upon the germ which merely lessens its virulence; (3) they may act directly upon the toxines which are secreted by the germs and neutralize their effects; (4) they may exert a sort of catabolic action upon the liquids or solids (tissues) of the organism, which enables them to repel the invasion of the disease germ.

The latter suggestion, in part, is probably near the truth of the matter — that the immune fluids enable the tissues to repel the invasion of the disease causing microbe. But there is no need of shading the subject in further darkness by suggesting that this is the effect of a catabolic action exerted by the fluids over the tissues. The so-called immune fluids are not "immune" in any sense, for the reason that they are dead tissues, and immunity

from disease is a property of life. The secret of the whole subject is that the poison of the disease microbe is contained in the blood and has power of causing immunity. I do not know that this fact has been proved, but I submit that this hypothesis is the only one possible to suggest which can fully explain all the factors of the problem.

A living tissue can exert over dead organic matter a catalytic action, as in the digestion of foods, where living tissues secrete a digestive fluid; but the only manner in which an organic fluid, by the force of chemical action, can cause immunity of living tissues from disease is by containing and using the poison which causes the disease. The law of immunity is that an attack of a disease, through its poison, gives immunity from disease. We do not know of any other cause which gives immunity; and the various forms of disease, or rather the various methods and types of the cause, whether as virus, serum, culture fluid, or the microbe itself, all are simply conditions which include the same ptomaine, differing only in quantity. There is a tendency in the medical mind to ascribe immunity to a few only of the tissues of the body, and some experimenters, as Metschnikoff, think that the invasive power of the microbe is met by the repelling power of a single animal tissue or factor—the phagocytes. Metschnikoff thinks that the phagocytes meet the invasive microbes and defeat them in battle. These organisms of Metschnikoff are, of course, the results and creations of one attack of disease, as they

do not appear to exist or at least are not active until after an attack. This being true it follows that these organisms are the creations of poisoning and therefore they are cells or organisms which, by the chemical force of poisoning, have acquired the power of doing successful battle with the microbe. But this theory will not hold good in relation to the general law of poisoning. In alcohol, opium, arsenic, and other poisoning the same immunity is created. This tolerance of the tissues to these drugs is certainly not due to an organism which acquires the power of resisting the germ of disease, for in such poisoning and resulting disease and immunity there is no microbe.

But it having been proved that Metschnikoff's organisms are created by disease, and the evidence being clear how this is done, it then becomes necessary to prove why a general poisoning of an organism does not directly give other tissues than phagocytes an immunity. If the phagocytes themselves are capable of destroying the germ of disease, thus protecting the rest of the organism against disease invasion, then the phagocytes are themselves immune and acquired this faculty by poisoning. It seems clear that any tissue cell of an organism can acquire this property of immunity, and that all tissues do, under like conditions. If this is not true, then it is not true in biology that all organisms are subject to variation of type under changes of environment, relating to use and disuse; and it is then also not true that an immunity is created in the case of poi-

soning by organic and mineral poisons. In the latter variety of poisoning is meant, of course; that an immunity is created by the habitual use of these drugs to the average fatal dose of the drug.

It may be shown perhaps by actual observation with the microscope that phagocytes are immune in certain definite relations. No doubt this fact has been shown and is a fact. But the deduction from this fact that the phagocytes are therefore the sole agents of general immunity is not verified until it is demonstrated that no other tissue of the same organism has immunity. Clearly this has not been done; therefore the biological truth that all organisms have the resources of variation, and the general law of poisons that all poisoning creates an immunity, under like conditions, are as yet undisturbed, remaining as general laws of life, of disease, and of immunity from disease.

It follows that no discovery seems to invalidate the great general law of natural selection in its relation to the prevention of disease by the organic laws of nature, or by an intelligent adaptation and administration of these laws in practice. The first of these laws about which I wish to speak in this relation is variation.

The law of organisms, which are alive and obtain their own living, is that change of condition or environment, in relation to mental and bodily activities, necessitates a change in the type of the organism. The immediate cause of the change of type is use and disuse, as relates to the structure and the

physiology of the organism. The rule is that all organisms have the resources of variation subject to these conditions and to changes of condition. A change of climate, a change of environment relating to food supply and to personal enemies always requires a new adaptation of the organism. This necessitates a change of type, or a variation relating to structure and activities. Under the law of poisons, when an organism is subjected to the action of a drug or ptomaine there is a change of conditions which must be met. The organism must either be destroyed or it must tolerate the poison. We know very well what are the results of the habitual use of poisons. These results are the increased tolerance of the tissues poisoned to the action of the poison and the establishment of a craving for the poison. In disease the result is an increased tolerance to the poison, which is the basis of an immunity to the disease, because it is sufficient to overcome the invasive power of the microbe.

The next factor of natural selection is heredity. The variations of organisms, in the history of plants and animals, have created the useful and beautiful forms of existence and have written the history of life. Heredity has made humanity and written the history of civilization and ethical development.

The variation of type which waits upon use, or labor and adaptation — upon thoughtfulness, invention, genius, and ambition — has created the cities, the nations, the governments, and the institutions

of civilized life. It has saved humanity from extinction by disease. It has, through the force of heredity, transmitted the qualities and the structures that use has made, and has adapted the race to climate, to work, to the soil, the air, the seasons, and made man the conqueror and owner of the earth.

Heredity is selective in its work. It transmits no deformities of accident or misfortune. It does not transmit disease. Heredity transmits the variations which adaptation and education have created. If there is no new variation to transmit, then heredity transmits the primitive type; sometimes going back through generations for an ancient form of figure or mental type. The rule of heredity is to leave out the vicious and the deformed structures and to transmit the improved features in the organic types.

It is clear enough that an immunity to disease, being a product of organic structure, which is developed by the forces of adaptation, must be in part hereditary. It is also clear that any deformity of structure of any factor of the anatomy of an organism cannot be transmitted. If disease were hereditary, humanity would be a monstrosity. Nature transmits whatever tolerance to disease there may be, but if this tolerance is not sufficient to prevent the invasion of the germ of disease, then the progeny must be liable to the causes of disease.

Nature is slow in great things and an understanding of her methods will give the reason for it. If it is a law that a change of condition must result

in a variation of organic structure by adaptation, then we must appreciate that when disease is ended, even though an immunity is gained, there is a change to new conditions, and a corresponding change of type of the organism must follow. This change is backward to the conditions which obtained before the disease occurred. We would suppose in view of this fact that the immunity gained will be lost to a greater or less degree, and this is what actually occurs. All inoculations for all diseases must be repeated in order to secure a practical immunity. Vaccination must be often repeated to be of any service. The reason of it all is that the immunity is actually lost by this law of atavism. Variation, heredity, and atavism seem to underlie the beauty, the glory, and the good health of the nations of the earth.

CHAPTER VIII.

QUEER MEDICAL FADS.

A FEW years ago Dr. Brown-Sequard, an eminent physiologist, conceived the idea that the elixir of animal germ cells had phenomenal power and might have unknown powers. Brown-Sequard seems to have reasoned that if the germ cells had the power of originating individual life and transmitting the heredity of species, genera, and orders, they would, perhaps, renew the life energy of old people. The heritage of life is death. All men recognize that death is an inevitable result of the laws of heredity. Physiology records that the forces which renew life reside in the germ cells. These cells contain the mystery of life—its type, its soul, its secrets. These cells bear the written record of the kingdoms and types of life that are dead. Every past and forgotten type of anatomical formation of brain, thought, and instinct is recorded on the walls of the germ cells. The conception and birth of a new individual bring all these forces into play. A new person, or living individual, is seemingly created, but not so in reality. Nature in apparent creation of a new individual takes an old book, or rather an old library, and resetting the type with the addition of some fresh editorial comments,

a preface, and a few more perfect illustrations, perhaps, issues a new volume on an old subject. Every new individual is a compilation, more or less, as is every new book. Every new book embraces what has gone before in science, or literature and history, along special and general lines. Every new individual does the same. The little variations, additions, and improvements in new books and new individuals indicate the progress of development which underlies the evolution of all things — men as well as books.

Brown-Sequard was a biological bibliomaniac. He knew that the method of reproduction in bringing out new books is to rewrite them and reprint them in printing shops. When old books are dead their heredity must be preserved, so far as their usefulness is concerned, in the ideas and types of new books. The old book cannot be inoculated with modern things and made to serve duty once more. In time the type, paper, age, ideas, are preserved by bibliomaniacs as curiosities. All that is worth preserving in the elements is now found in new books, as well as a few elements among the immediate ancestry that the authors and bookmakers are trying to eliminate.

Brown-Sequard wanted to save the old books at the expense of new ones. He thought he could employ the forces of the printing shops, or the publishing house, in some manner, to reprint the old book; but he failed. The printers knew not the old book; they did not know how to set up new type

and run it through the cylinder press and the bindery, add a new preface, and declare that the old print was a new issue and up to the times. Brown-Sequard's elixir failed. His hypodermic of germ cells went wandering through the blood current in old and diseased vessels, looking upon the ancient blood corpuscles as modern youth study the ruins of old cities, with curiosity, but with no intention of making a permanent residence.

The old book gives up its ideas to a writer, its old paper to a paper mill, its old methods, history, form, and individuality to the forces of reproduction; all that is useful is preserved in the new book. The old man must do the same His body must go down to the elemental mill of nature and be ground over; but his progeny will inherit and the world will know his type, his thought, his individuality, by a new individual. Nature cannot make him young. Joshua may have delayed the sun in its course and jarred the universe, but Brown-Sequard's elixir probably never added a day to the existence of an octogenarian. Neither nature nor man puts new wine into old bottles.

Brown-Sequard was an experimental physiologist. He was a scientist. As we all know, all science is the result of experiment. Edison is an experimental scientist. Brown-Sequard was honest in his experiment, but mistaken in the results. He may have conceived the experiment through a desire to find a remedy for old age; but reproduction, as a force of biology, cannot be used in that

manner. Brown-Sequard's persistent belief in the virtue of his experiment simply shows delusion. His elixir is dead. It failed to tune up the old harp strings of humanity to accompany the angelic song and symphony of perpetual youth. Nature had already invented second childhood. Brown-Sequard's elixir failed to put a new soul, new life, new ambitions, hopes, loves, disappointments into the shrunken brains of the aged, where they would have been as lost to the world as school children in a desert.

All inventions similar to Brown-Sequard's elixir have failed. The earliest faith sought eternal and incarnate life on earth ; but, witnessing inevitable relentless death, learned to transfer immortality to another world with golden streets and fields in perpetual bloom. The alchemists spent their day and energy in the search for an elixir vitæ that might at least procrastinate death, if not perpetuate life. The earliest man feared death ; his children hoped to avoid it. But the work of heredity is over all living things. The inevitable law of heredity is that all living things must perish ; that individual forms, even if never diseased, must approach the portal of senility with feeble energy, and, comforted by a benumbing euthanasia, give their bodies to the forces of nature, losing their individuality among the chemical elements. "It is appointed unto all men once to die." If they are not killed by disease, they die from old age, as the consequence of disease upon their ancestry. I do not doubt that this

heredity could be changed. I believe that the banishment of all poisons would prolong life; that an extended average duration of life could be transmitted by heredity, which would ultimately increase the duration of life to many hundred years. But no alchemist's or Brown-Sequard's elixir can do this work. The work can be done only by natural selection when the factor of poisoning is omitted from the problem of life.

But it appears that Sequard's idea in his life-giving elixir did not die childless. The germ cell of the guinea-pig was prolific with the potency and power of great inventions.

Dr. William A. Hammond, at one time Surgeon-General of the United States army, illustrates the remarkable power of "cerebrine" on the muscular strength by exhibiting an athlete putting up a dumb-bell weighing forty-five pounds. He raised the bell fourteen times with his right hand and eleven times with his left; which was declared to be the limit of his strength and ability. After an injection of the cerebrine he put up the bell forty-two times with his right and thirty-five times with his left arm.

Dr. Hammond knew very well when making this exhibition that the evidence of the athlete's ability, before and after taking cerebrine, is subjective evidence and is not, therefore, scientific. Dr. Hammond, perhaps, did not intend to give a scientific exhibition. The test reminds us of those given a few years ago by scientific and other gentlemen in

illustration of the phenomena of hypnotism. These gentlemen employed professional subjects for their experiments. Dr. Hammond's athlete appears to be of this character.

Dr. Hammond claims that cerebrine can strengthen the energy of the prize fighter and of the college crews, as well as cure disease, restore lost vigor, stimulate decaying intellect, renew the departing life. Humanity, in relation to the world and the great future, when cerebrine becomes generally used, will occupy the position of the heroes of Conway's great fiction, "Called Back." We may imagine the popularity and usefulness of a remedy to people who desire to make some strenuous effort of mind or body, "the one great effort of their lives," for fortune, for fame, or for life.

People will no longer be content with the humble prayer, "Give us this day our daily bread," but the supplication will be, "Give us our cerebrine that we may have intellects like Newton, strength like Hercules, and speed like the winged Mercury." We all desire these things; we all want clear, unfading minds; we want strength, capability, and beauty. These things underlie success. We all want success. Dr. Hammond has learned the desires of the human heart. He knows what all people want and would like to have forever. He knows why these things are sometimes failures and why they fade away.

But has Dr. Hammond found a remedy? He is a scientist second to no physician in the United

States. He offers us no clinical evidence. He shows us no cures. He points out no cases of old men made young again. He shows us only this farce of an athlete putting up a dumb-bell, and a patent for his remedy.

The saddest feature of this business is the attitude of the medical profession toward Dr. Hammond. The doctor published his formula, but he violates the code by fixing a patent upon it. The code of medical ethics knows the formula, but is not allowed to make the remedy. This appears to be so much more satisfactory to the code than a failure to know the remedy. In Dr. Hammond's cerebrine there is no evidence of its value except that offered by the athlete. Dr. Hammond is making no mistake in this matter. He knows all about the conception, trial, and failure of Brown-Sequard's elixir. He knows very well that Brown-Sequard was led to make these experiments from accurate physiological data. Brown-Sequard relied on a possible unknown power for results which the germ cells might possess, based on his knowledge of the reproductive power he knew them to possess. Brown-Sequard was mistaken. But there are no germ cells in cerebrine, or cardine, or nervine, or musculine — Dr. Hammond's new productions. There is not even beef essence in his cookery, nor genius in his method. Dr. Hammond has been a great man in the profession. He is a tower of professional grandeur and example. He is no man's intellectual inferior in the medical profession. In

his specialty he has stood for years as the most imposing colossus of them all. His cerebrine marks his fall. It is like the decay of the monolith and indicates that the beautiful stone is simply turning to powder and will soon be dust.

In the manufacture of these animal remedies Dr. Hammond takes a quantity of brain tissue, or other tissue as may be required, and adding a sufficient quantity of boric acid and glycerine, subjects the whole mass to filtration and maceration under pressure for several months.

Seriously, what is cerebrine, and what is cardine, musculine, and the remainder of these extracts? It is clear, from the process of preparation, as detailed by Dr. Hammond—of ox brain and the other articles—that they will contain very little in addition to the boric acid, the alcohol, and whatever chemical compounds the tissues so subjected may be transformed into and may have contained at the beginning of the manipulation. The chemical compounds will be the leucomaines—the waste products of the decomposition of the tissue. Let us see what these leucomaines are and what effect they will have if hypodermically injected into the blood current.

Leucomaines are the basic products of the retrograde metamorphosis of the tissues, including protoplasm. These basic products are being manufactured continuously during the exercise of the animal body. They are the chemical residue of the changes of a chemical nature which results from exercise, work, or development of energy in

any tissue. They result from any chemical decomposition of any nitrogenous tissue, if the decomposition is free from putrefaction. Dr. Hammond's process of the preparation of ox brains is free from putrefaction, or is supposed to be; therefore his product must be leucomaines. His cerebrine is a basic chemical compound, added to boric acid and alcohol.

But if his process is not kept aseptic, and putrefaction is the result, he will also get, in his cerebrine, an assortment of ptomaines or bacterial products. These will likely be putrescine and cadaverine. These ptomaines are of course deadly poisons and would scarcely answer for medicine.

But the leucomaines are also poisonous, although they are tolerated in the animal body, as they are created and occupy the body until they are eliminated. An excessive quantity, however, in the blood current always causes poisoning; in fact, in many diseases of fatal nature the immediate cause of death is the retention in the body of these poisons, owing to the disease of some eliminating organ. This is the usual mode of death in Bright's disease.

These leucomaines are divided into two groups called the uric acid group and the creatinine group. In the first group the two principal and characteristic compounds are adenine and hypoxanthine. Now as these are the typical leucomaines which result from the decomposition of tissue cells and nuclei, we can, by understanding them, obtain what I would consider a correct idea and estimate of

Dr. Hammond's cerebrine and its action as a remedy.

Adenine was first prepared from the pancreatic gland by a chemist who gave to the basic substance the name adenine,—the Greek derivative meaning gland. It is a white, crystalline powder. Experiments show that it is also derived from the nuclei of animal and vegetable cells. It is found in nearly all organs of the animal body; so whether Dr. Hammond uses heart, liver, brain, nerve, or muscle for his preparation, he cannot avoid the adenine of the cell nuclei of these tissues in his remedy. The substance is also found in tea leaves. Adenine stimulates muscular activity, when inoculated, and it may be, therefore, that the great volubility which is reported to attend tea parties may be due, in part, to adenine. However this may be, it is no doubt a fact that the drug is a poison, and as a medicine or a food has no value. If it were of any possible use in the animal economy, nature would not have provided a method of carrying it out of the body as soon as manufactured. Our leading chemists, however, submit a supposition that adenine has something to do with the reproduction of the non-nucleated cells. These cells have no power of self reproduction, although they are quite numerous. The nucleus of the cell is, therefore, supposed to be the seat of the reproductive power, and the adenine in the nuclei is supposed to be the chemical compound and force which do the reproductive work. It is therefore inferred that the free adenine, during

its elimination, or at least its formation, is the reproductive agent of the non-nucleated cells.

The general description of hypoxanthine is so nearly like that of adenine that no one but a technical chemist can appreciate the difference.

All of these basic chemicals are waste products. They are the results of labor done. They are the ashes of the fires of life. It requires great energy to maintain the functions of an animal or human body. All this energy is manufactured by the burning of the body, or its oxidation. The tissue cells are the furnaces of this energy, while the ashes of their oxidation are the leucomaines. These ashes are carefully carried out of the body as they are manufactured. They are extraordinary products. Their safety depends on the fact that the animal body has excretory organs for their elimination, all trained and practiced. The drugs are untested and unknown as medicines.

If there is any virtue in musculine, it is obtained from beef-steak; and the same rule will apply to all the other products or extracts. But ashes are not food or medicine; they supply no energy; they are chemically dead. They belong to the realm of the elements. They are simply a measure of work that has been done. They can do nothing.

CHAPTER IX.

WHAT IS INEBRIETY?

HAVING defined the various phenomena of disease and the causes which superinduce them, it will be easy to understand that inebriety should be classed among the diseases of the human family. It remains to be shown at some length the nature of this malady, together with its results upon the individual and society, after which its treatment and cure may be proper subjects for consideration.

First, then, it may be asked, what is inebriety? Heretofore the terms, inebriety, dipsomania, alcoholism, etc., have been used indiscriminately to cover all phases of drinking. This has brought about an endless amount of confusion in the minds of the public at large. The majority of physicians also using the same terms makes necessary an intelligent definition, in order that we may thoroughly understand what inebriety is, the disease itself, and its cure. For this reason it is well to draw a line of demarcation and separate the users of alcohol into two classes, inebriates and chronic alcoholics.

In chronic alcoholism we have organic changes in the envelopes of the brain, blood vessels, and nerve cells, or the connective tissue, to an extent

that the functions of the brain are interfered with to a greater or less degree. Such persons are practically insane. An eminent jurist has stated that the dividing line between sanity and insanity is so difficult to define that if one should set up any one person as a type of sanity, every other person would be insane. While admitting the truth of this we should prefer to make a discrimination as follows: On one hand would be those cases in which pathological changes could be noticed upon careful dissection and microscopy, with the pathognomonic signs incident to such changes, classing these persons as chronic alcoholics. The other class would be composed of those cases in which no organic or pathological changes had occurred and that are defined as inebriates.

In order to perform the duties and functions proper to their office the nerve cells must be exceedingly sensitive, variable, and unstable; this very condition is what renders them so liable to the atavistic or metabolic changes that are produced by the action of alcohol, opium, cocaine, chloral, etc. These cells so soon become dependent upon the alcohol or narcotic for the proper and painless performance of their duties that a period quickly arrives when they will no longer perform their duties and functions properly and painlessly except when under this influence. In this way there has been created a necessity for the use of the alcohol or drugs, which necessity really constitutes the diseases of inebriety, morphinism, etc. In other words,

these cells have become so dependent upon a supply of alcohol or narcotics that nature's restorative remedies, which are only rest and nourishing food, fail to supply the cells with the nourishment that is brought about in this manner, in normal, healthy constitutions. Hence, in inebriety, morphinism, cocainism, etc., the underlying condition is the same, namely, the necessity that has been brought about by the indulgence in these articles for a continuance of the same.

Careful investigation of the cases presented to me for treatment reveals the fact that an exceedingly small proportion have advanced from the stage of cell necessity to that of change in cell structure. A normal, healthy man desires only those things which are healthful and proper for him ; for when he desires that which is harmful, it is a diseased desire and is always accompanied with a diseased or paralyzed self-control, thus indicating a vitiated condition of the nervous system. We know, also, that the opposing forces, appetite and will power, are unequal. The appetite is persistent, making its demands felt at all times ; while the will is intermittent and requires an exertion to call it forth and retain it in opposition to the appetite. This exertion is just as wearying as either muscular or intellectual labor, so that the time is sure to come when, wearied out by the contest, it only demands some emotional disturbance, like that of great joy or sorrow, pain or grief, or some business complication, to complete the relaxation of the will, when another indulgence

is sure to follow from the persistence of the appetite. As the chain is only as strong as its weakest link, so the will is only as strong as its lowest point of relaxation. The strength of will is dependent on the healthy condition of the nervous system.

I deny that people are made neurasthenic by overwork alone. People do not work enough. If an industrious, honest laborer, whether he labors with mind or muscle, becomes debilitated, the fad is to diagnose his malady as overwork. Generally, it is overpoisoning. A diversion of labor generally restores such people, because a change of climate and the active exercise involved in running and climbing about, get rid of the poison. Humanity, though condemned to work, is yet immensely lazy. Men may overplay, but they seldom overwork outside of slavery; while the slave is slower than time in a railway station, with the train ten minutes late.

The natural physiology of people manufactures poisons of many kinds. The tissue cells, of which all organs of the body are made up, are not very long lived. They multiply their kind, work for a living, furnish energy for their particular tissue in the work of the body and the work of the world, and then die. As they die, where they live, their bodies must be taken care of. Chemical action is brought to bear on these dead cells. Their composition and chemical forms are changed into new compounds fitted for elimination, or casting out of the body. These new chemical compounds are all poisons. The waste of the body is poison, which if

not immediately carried out of the body, will cause fatal poisoning. These poisons, that are many in number, are called leucomaines, because, as a rule, they resemble the white of eggs.

When these poisons are not efficiently removed from the body and begin to poison the person, then the poor man thinks he is overworked and has neurasthenia. You will observe that the relation of human kind to poison is intimate and terrible. Like the desperate charge of the six hundred, with foes in front of them, to the left and the right of them, the people of this earth are surrounded with poisons, and filled with poisons; which should convince the observer that the danger must be great, as in truth it is found to be.

There is probably no remedy so universal as an antidote, or so generally used for a poison, as alcohol. This drug is the instinctive remedy for sorrow, for too much joy, for mental fatigue and mental hebetude. It is taken for the blues. Others take it to emphasize, or, perhaps, give an accent to happiness. Alcohol is the great weather equalizer, and, like the lord of creation, himself or herself, it has a costume for each fleeting and changing season — in winter, brandy and whisky; in the heat of the summer, beer; in mild temperature, wine. Alcohol is the evolutionized genius from centuries of experience. It can fit all circumstances and conditions of life. It adapts itself to the delicate stomach as champagne. It cheers health. It gives battle like a valiant knight to disease. It takes the

place of food, without the labor of digestion. Alcohol is social and sociable. It loves the haunts of men and meets them on terms of equality. It loosens the tongues and puts words in the speech of cronies as well as foes. It makes enemies lie down together, like the lamb and lion of the millennium; while treating, friends assemble and pledge eternal fidelity over the cup that cheers and inebriates.

There is no human condition of life, or of mind, except the religion of Mahomet, to which the elastic nature of alcohol cannot adapt itself. People drink because they are lonesome or sad, or in society, or are happy, sick or well, rich or poor, friends or strangers, religious or wicked, maimed or sound, men or women, young or old, married or single, wedded or bereaved, childless or parents, new-born or dying. During the play, or between the acts, at work or recreation, and whether barbarian or civilized, owner or slave, ruler or servant, peasant or king—all men, under all conditions, find themselves adapted to alcohol, or alcohol adapted to them. If there is anything wrong with any of their adaptations to any condition of life, it may serve as an excuse for taking a drink.

None of the work of the world has demanded more of the bodily energy of mankind than that expended in resisting poisons in general, and perhaps alcohol in particular. By expenditure of energy, in this manner, I mean the energy of the tissue cells; physiological energy is a product of these cells. From the material or physical side of

the question, the mind, the nerve force of sensation, special sense, and emotion, the forces of the respiration, circulation, digestion, assimilation, secretion, and excretion are all derived from these cells of the tissues. These little microscopic cells are the units of the tissues and organs, and they are the units of life. In poisoning the battle is between the poison with its chemical energy and the cells with their physiological energy. The result is the decomposition of the poison ; and if the cells are not killed, they necessarily undergo a variation in type, which variation, in their anatomy and functions, enables them to resist the poison, whatever it may be, to a greater extent or degree.

Take a look at the world and its poisons ; take a bird's-eye view of the awful fatality of the acute infectious and contagious diseases. They attack everybody and destroy almost everybody. See the energy lost in fighting the enemy, which energy is lost because the people are killed. Then see the amount of energy lost and time lost in fighting diseases by the people who recover. One-half or more of the strength of human life is spent in fighting poisons. Apply this rule to national life and we may estimate that the Egyptians spent more life force fighting disease poison than in building the pyramids. The European middle ages spent more of their life fighting great epidemics than in building all their castles and cities, or in fighting each other. It is this waste of energy and the short life which it brings which constitute the chief impedi-

ment of the human race in its struggle for the perfect type of manhood and the perfect type of government.

Alcohol is not among the least of the poisons in destroying human energy. Millions of people give up their whole lives as slaves to this poison, which they can resist just enough, perhaps, not to be killed, but not enough to prevent their being bound in slavery to the drug.

As a rule the inebriate is worse than a dead man, so far as his usefulness to the community is related. He earns but little, throws that away, and is an expense to the public, which must maintain police systems, prisons, criminal courts, and temperance workers — chiefly on his account.

Inebriety, then, consists in a variation of the poisoned cells, which variation causes a change in their physiology. The variation is a molecular change, and not known to the eye or microscope. It is a change in the molecules of the protoplasm of the cells. The greater phenomena of life exist in the molecules and their activities. Here are created hunger, love, thought, ideas, will, memory, desire, and the energies of life and mind. Look at a regiment of soldiers; they form in many different ways. The molecules do the same, and each change means some manifestation of life or mind. A dose of poison causes an instant change of molecular arrangement to resist the poison. Repeated doses of poison cause such repeated similar molecular changes that these changes become automatic

and habitual conditions. The work of the cell is henceforth done from the basis of this molecular formation, and to preserve this type of formation alcohol is necessary. Then there is the condition of inebriety. The symptoms of inebriety consist in a craving for liquor, which the will is powerless to control; then follows a reaction and a rejection of the poison, and a period of sobriety, which is absolute in character. Inebriety is an automatism of the cells, interpreted as a crave for alcohol. The automatism is periodical in character, and this quality is due to the fact that the education of the cells is periodical. When a man begins to drink, his essays are periodical, as come the feasts, the social meetings, the occasions of other character and kind which demand drink or are associated with, drink. Beginning to drink is a vice, either on the part of the coming inebriate or those who may be responsible. It may simply be a mistake. Inebriety itself is a disease.

CHAPTER X.

THE EVIL OF INTEMPERANCE.

THE water of the earth, as a rule, is not fit to drink. It is polluted, contaminated, adulterated, defiled. There is no other source of disease so prolific as water. It contains the microbes of typhoid, cholera, consumption, and the eggs and larvæ of innumerable parasites. In Chicago, taking a drink of water means the risk of typhoid ; in New Orleans it is malaria and pneumonia ; in New York it is typhoid again.

In cities the rule is to draw the water supply from lakes and rivers. The rule is, also, to put the sewerage in the same rivers and lakes. In Chicago Lake Michigan is used for both purposes. There is a notable sanitary improvement in other cities. These are not so depraved as to drink the water contaminated by their own sewerage ; but have advanced so far in ethical improvement and sanitary evolution that they only pollute each other's water supply. Albany contaminates the ice fields of New York ; St. Louis draws a supply defiled by the refuse of the cities of the Mississippi and Illinois river valleys.

In country places the water is drawn from surface wells, or the supply is the ground water. This

water continually washes the grave yards, cesspools, stock yards, and vaults and gathers up the microbe of disease. These country places have their regular annual crops of typhoid and consumption, as they do their seedtime and harvest.

To escape these dangers some people avoid drinking water as much as possible. I think that during the past few years I have met not a few individuals who succeeded in getting along for a considerable time without drinking any water. People who can afford it buy the gaseous table waters from numerous springs. Others use Pasteur filters; but they grow faint when they examine the debris of the filter and see what it contains — what the sad "might have been" would have been in their drink without the filter.

The sparkling appearance of water, so pure and bright, as it has been apotheosized, is due to carbonic dioxide. This carbonic gas, as it is found in water, is the product of putrefaction in the soils. It simply indicates that the water originally came from a soil polluted by decaying matter.

A popular ode is the well-remembered "Old Oaken Bucket." How many of us, like the writer of it, remember it as it hung in the well. Like him we have drawn its dripping staves from pellucid depths, and, fixing our lips to the frayed edge, have drank passionately our fill at command of that most unendurable of all sensations, thirst. It is only within a few years that the world has learned that fever lurks within the coolness of clear waters in

old oaken buckets, and even while thirst is cooled, the seeds of a greater thirst are sown. I presume the poison of many thousand cases annually of typhoid are derived from the country wells — drawn from cool, pellucid depths, by ancient well sweeps, chain and suction pumps, or even by the end of the clothes line or bucket hook.

A man will suffer hunger for a time with great fortitude — particularly if there is anything in it — provided he is supplied with drink. He will not endure thirst for love or money, no matter how well he is fed. All people know the torture of thirst, which has driven men to the tapping of their veins for the drinking of their own blood. When the inspired writer wished to impress upon his readers the torment of the damned, in language that all men could understand, he pictured Dives in torment asking of Lazarus up in Abraham's bosom for just a drop of water to cool his thirst. Even one drop might break the terrible monotony, the eternal desert of the torture of his thirst. It is interesting to remember how Lazarus treated this thirsty sinner. Did he give him water? No, he refused him even that drop of pure water; just like one of our earthly commissioners of a public water-works.

The other drinks of this world contain alcohol. They are pleasant and nauseous and terrible. They do not cause typhoid and diphtheria and like diseases, but they all cause inebriety. They cause no other disease than inebriety, and inebriety consists in an insane craving for alcohol. With water and

its diseases on one hand and alcoholic drinks and inebriety on the other, thirsty humanity is "between the devil and the deep sea." Typhoid has no charms over inebriety; both mean suffering — may be death. Inebriety may be preferable to cholera; but alcohol kills just as effectually as the comma bacillus. Yet we must drink, and I am not prepared to say that the moral suasion reformer is correct in recommending the superior sanitary qualities of water. It is necessary, first, to reform the water.

In the meantime you can see the gaunt spectre, Thirst, clothed in the mantle of despair. Her limbs are shriveled, her blood fevered, her throat burning. You see above her the brazen sky, with the glint of metallic stars; while around her are the withered grass, the dry leaves of the trees, and beneath her feet the crumbling, arid soil. You may hear her husky voice calling for drink. In one hand she holds the fabled glass of water, sparkling and bright, while in the other you see the cup of beaded wine. You know that Thirst cannot, will not, hesitate long; I ask you in the name of humanity, health, happiness, and long life, which of these shall she drink? Whatever her choice may be we must remember at all times the curse of drink — that it is a wicked, monstrous, hellish evil in this world of sin.

The great underlying cause of wickedness at the present age of the world would seem to be intemperance. It would appear that the original respon-

sibility for sin, Satan himself, together with Sabbath breaking, the unregenerate heart, crimes against person and property, and the sin that shall not be forgiven, have all laid their burdens upon intemperance; this sin of all sins and the greatest of all immoralities underlies them all.

If a man commit murder, he is either instigated by liquor directly or is sustained and soothed by drink. If he incidentally commits manslaughter by accident, it is generally whisky that underlies the act. If a man kill himself by chance, the fashion is to make inquiries on the subject of liquor in relation to the sad occurrence. In all clinical reports of diseases the question of alcoholism is always considered, and alcohol frequently shoulders the responsibility for an unfortunate ending of the case.

In public brawls and indiscriminate fighting, liquor is the general in command. Whisky is the raven of melancholy, despair, and poverty in thousands of homes. When a woman is the picture of misery and does drudgery to support a family of children, the question a stranger will ask is, "Is her husband dead or a drunkard?" King Alcohol is the great "ward heeler" in matters of municipal politics. He dominates the government, dictates appointments, shows his "fine hand" in the ordinances, and impedes the execution of the laws.

No man can serve alcohol and virtue. Public morals and good laws must be sacrificed if alcohol is favored. If people debauch themselves, or pro-

fane the Sabbath, the law must also be violated. The backdoor of a saloon on a Sabbath morning admits the law breaker, the inebriate, men who commit the crimes and the sins,—who degrade public morals, who desecrate divine ordinances, who pollute, also, the virtue and happiness of the home.

No matter where it is obtained, or when, alcohol is the great cause of human wretchedness and public evil. It is the materialization of the mythological devil. It is Satan let loose for a thousand years. It is the Beëlzebub of activity rather than of theory. It is the great underlying cause of the evil of the nineteenth century.

The better class of men and women, including the people who are engaged in the work of reform and abating evil, recognize these truths about alcohol. The object of their labors is to cure intemperance. To the casual thinker the problem is an easy one. But results do not flatter the labor of effects. Nothing is easier to think than is the abstract fact that entire prohibition would cure intemperance; but, in actual fact, prohibition seems impossible and is conspicuous by its failure to prohibit.

There must be some cause behind intemperance which makes prohibition so difficult. I think it is readily found and understood; I believe it to be poor sanitation and sickness.

The greater portion of liquor consumed is drank by people—the masses of the people—who feel the need of a stimulus by reason of ill health. They are poisoned by the putrefaction of dead organic

matter in public places, by cemeteries, by rivers containing sewage, by filthy houses, yards, and streets, and by imperfect sewers.

More than half a million people die every year from diseases that are called preventable, or filth, or germ diseases. They are so called because they could be prevented. They are derived from filth and they are caused by germs.

The lax sanitation of the great cities of America causes pollution of the water, soil, and air of the land. People drink polluted water, breathe polluted air, and live over polluted soils. As a consequence they are poisoned. The instinctive remedy appears to be alcohol. Sewer gas and the general products of the putrefaction of dead organic matter poison the blood, depress the spirits, weaken the appetite and digestion, and the people drink alcohol.

I believe the great cause of learning to drink is sickness and poor sanitation, and that this is what makes prohibitory laws difficult or impossible. The way to secure prohibition is to banish disease and disease infection from the earth. The disease poisons are the constituents of King Alcohol. If they are banished, he will abdicate, without waiting to be prohibited.

Inebriety is a disease. I do not say that inebriety causes people to begin drinking; but when a man begins drinking from any cause whatever, he will cause inebriety if he continues long enough. Inebriety consists in the periodical return of a craving for alcohol, a debauch and then a period of sobriety.

The interval of sobriety is a part of the disease; just as much a part of it as the debauch itself. It is no indication that the man will never drink again; he will drink again. Of course, he protests that he never will. He reforms. His remorse is deep. His repentance wears the sackcloth and ashes. His humiliation lays him groveling in the dust. One would think that such mental agony would prevent any return of the craving for drink, by causing a shock to the nervous system. But not so; at the allotted time all remorse has disappeared. The inebriac phantoms, mental horrors, and the protestations of reform have faded away, as buzzards disappear in the distance when we watch their flight. Alcohol has lost its terror. The man grows to believe, by the delusion of his disease, that he can take a glass and then desist. Perhaps he has will enough left to do this; perhaps he may repeat it, which will strengthen his confidence in his will power wonderfully and fatally; for he now rapidly goes on to his regular debauch.

It is impossible to take any poison habitually, without causing disease. All disease is caused by poison. Alcohol cannot be drank for any great time, or in any great quantity, without causing the disease of inebriety.

Drunkenness, until very lately, was considered a vice, due to wickedness, a weak will, or vicious disposition. But not all inebriates are vicious or wicked, or have a weak will. Some inebriates are the brightest, the best and purest souled people on earth.

They are the very salt of society, the church, and the business and working world. A vicious man, wicked man, weak-willed man, as well as persons having chronic disease, persons in perfect health, people in good society, dissolute persons, honest and vile, pious people, saints, sinners, the wise, the educated, the ignorant, the civilized, the barbarian, are all alike and equally susceptible to inebriety. All that is required to make an inebriate of any of them is sufficient alcoholic drink.

But supposed cures of inebriety, by mental impressions of some kind or other, have always been employed. Imprisonment, moral reform, exhortations, pledge signing, and conversion from sins have been used to this end. None of these means ever cured inebriety. It does not follow that because a man will not drink, his inebriety is cured. The disease is there; but his will is stronger than the craving caused by the disease. When the disease is cured, no will force is needed to prevent drinking. Imagination can cure no disease except it be caused by imagination; but people having real disease can believe themselves cured. That is to say, the signs and symptoms of a disease may be suppressed by dominant ideas or by belief, and yet the real disease remain.

I believe that good sanitation underlies the prevention of inebriety. In the future the germ disease will be prevented—it will not be cured. The discovery of the cause of disease did not lead to any new method of cure, but it led to a new method,

and a certain one, of prevention. Beginning to drink is frequently traced to some illness, but continuing to drink is caused by the disease of inebriety. The sanitation which will destroy the disease germ will also destroy the cause of beginning to drink.

CHAPTER XI.

IS ALCOHOL A FOOD?

THE discussion of the question, "Is alcohol a food?" has been before the scientific public for so long a time, and the ground has been so thoroughly investigated, that little which is new can be offered. That the question is not settled beyond the necessity of discussion, or the disposition to discuss it, is not due so much to the absence of scientific data as to the bias of mind created by temperance agitation.

The line of demarcation between nutrition and poisoning is not sharply drawn, or a definite measure; it is a moving equilibrium. It is impossible to define a food without limitations and qualifications. A poison cannot be defined without the same qualifications; hence, if there are reasons other than physiological ones why alcohol should be classed as a food or simply as a poison, then great difficulty in making either classification must be experienced. When there is controversy over a subject the contestants should agree upon a definition of terms in any given problem. To settle the question scientifically whether alcohol is a food or not, an agreement must first be reached on a definition of food and nutrition, in relation to tissue

building and physiological force, and poisons and poisoning in relation to pathological force. The boundary line between these things can only be fixed, as a stationary line, by arbitration. When this is done, by taking this line as a datum the relative food value, medical value, and poisoning qualities of alcohol can be settled.

The second source of difficulty in fixing the food relations of alcohol would seem to depend upon errors of induction from experiments, also due to mental bias. The question of physiological action in relation to food and poisoning is a very complex one. In making deductions from experiments all the complex factors of the problem must be estimated; which, I may say, I have never seen done in the record of any experiment yet made on the food relations of alcohol. I have seen reports of this character, denying that alcohol is a food, because it furnishes no material for building up the materials of tissues, cells, and nuclei. These writers should state conscientiously when writing for the public good that food is more complex in action, and not only supplies matter but force. Again, certain writers declare, because alcohol is a poison in a certain dose and before oxidation in the blood, therefore it can have no other action in any dose, before oxidation or afterwards. These writers should admit that alcohol is not eliminated as alcohol; that it is a stimulant in small doses; that the greater part is oxidized in the blood and tissues, or chemically changed; and that it is true of this as

of all drugs, that a small quantity acts as a stimulant on the same tissues to which in a large enough quantity it has entirely an opposite effect. In all poisons the rule is the same. The deduction is therefore incorrect, that because alcohol is a poison in a large dose it is not a stimulant or a medicine in a small one; nor is it correct to infer that because alcohol furnishes material for building tissues, it therefore supplies physiological force as a sequence of oxidation in the system. If it is admitted that all alcohol drank is not eliminated, then it follows that it is chemically changed in the system. If this is true, then, to deny that the product is force, which must be correlated with physiological force, is simply denying the conservation of energy, which is useless. To deny that alcohol is a stimulant in a small dose, and yet insist it is a poison in a large quantity, is to deny the fundamental principle of poisons and poisoning; to reject alcohol as a medicine for this reason would demand the repudiation of all drugs used by physicians as medicines; or, at least, those drugs which are used to antagonize the symptoms of disease in ptomaine or germ poisoning of whatever character or kind. Any of the drugs, as digitalis, atropia, morphia, hyoscyamus, etc., will cause fatal results by paralysis of the organs upon which in a small dose they act as stimulants and are used as medicines. I speak of this as a generality, and do not include the physiological complexities of the case, involving the special facts that in the treatment of diseases

the poisonous dose of drugs is usually given. It is well known, that in, for instance, a too rapid action of the heart, digitalis is administered in poisonous doses to paralyze certain nerves, so as to equal the inhibitory and motor forces, in order to lessen the frequency of the heart's action. If it is agreed that any substance is a food which, when taken into the body, can be decomposed with the liberation of heat force or energy—which must then necessarily be correlated with physiological force,—then alcohol must rank in this limited sense among the articles having a "food value." I do not regard as satisfactory the experiments which have been made, with the object of proving that alcohol when drank is all of it eliminated. The evidence seems to prove the other proposition, that the greater part of it is decomposed. If this is true, there is no escape from the conclusion that alcohol has a food value, however much this value may be destroyed by a poisonous action. In relation to force, or the development of force in the body, or as a result of food qualities, it would appear that alcohol is complex in its action; that it has a stimulating and poisonous action while it is yet alcohol in the blood; and that it has a further action, relating to force of a physiological character, when it is decomposed or consumed in the body. It is clear, then, that an understanding of the food relations of alcohol must depend upon an agreement of the definition of the general principles which underlie nutrition, in the tissue-building sense and in the development of force, while all

the factors must enter into the problem. If an estimate of the food value of alcohol is made with the definition of food limited to tissue-building, then alcohol is not a food. If the estimate is made on the basis of a large dose of alcohol, and its poisonous action as alcohol before its decomposition, then alcohol is not a food or even a medicine, it is nothing but poison. If the estimate is made on the basis of a small quantity of alcohol, acting as a stimulant before it is decomposed, then alcohol is not a food, but ranks as a medicine; acting as a stimulant upon certain organs to which in a large enough quantity it is a poison. But if we define food as an article which furnishes material for tissue-building, and which also, when decomposed, yields force which is correlated with physiological force, and if the question is verified that alcohol, when decomposed, furnishes heat inside the body, as it does when burned outside, then we must certainly conclude that alcohol has, as a factor of its physiological action, a food value, limited to this condition of things, so far as its direct action is concerned.

But it is a matter of demonstration that this is not the extent of the action of alcohol. It has an inhibitory action on cell metabolism. It prevents the waste of tissues. Under its use the elimination of waste products, as urea and leucomaines, are diminished nearly one-half. This result can be accomplished only by restraining the metabolism of cells. It is not done by retaining effete products in

the blood, for such a result would be disastrous. This action of alcohol in the treatment of excessive waste is certainly apparent and of the greatest use. Alcohol then acts indirectly, in this manner, not to supply food, but to prevent waste. It is the great conservative drug of nutrition. In the laboring man a certain quantity of alcohol will preserve the body weight, with the same food pounds of labor, and with a given quantity of food; and if these other things are equal, the absence of the alcohol will require more food, or a decrease either in the labor or body weight. I understand that these things are matters of demonstration, and that the every-day use of alcohol among laborers satisfactorily proves the value of the use, and not the abuse, of alcohol as a food,—direct and indirect. In disease the food value, or what may be termed the medical value, though there is no difference, is seen in the same results. The ptomaines increase the body waste, elevate the body temperature, and cause local inflammatory disturbances of nutrition. Alcohol antagonizes all of these resultants. It lowers the temperature in fever and greatly lessens the body waste caused by the ptomaines of disease. The ptomaines are destructive, but alcohol is, as I have said, the conservative drug of nutrition. One of the weakest arguments I have ever heard relating to the food question of alcohol is that the conservation of cell life in this manner is a detriment to the tissues; that cells have their normal duration of existence, but beyond this term of life, whatever it may

be, the cell should not live and is a damage to tissues. Logically followed out the same argument must apply to individuals as well as cells, and while we all admit that human life has its expectation of death, as well as its "expectation of life," yet all sane people believe that, individually, the average duration of life is the fundamental force of civilization, and that human progress directly depends upon the average length of days. Personally, I have made no experiments with alcohol, relating to its food power. My observations and tests have all been on alcohol in its relations as a poison. However true it may be that alcohol has a food power, it is certainly true, as the victims of alcohol come to me, that they do not require any more of this sort of diet. But, as I have indicated, the abuse of alcohol does not disprove its physiological uses, although it is true that a substitution of another carbonaceous food is necessary in the cure of drunkenness. The food value of alcohol is of no use here. The old experiments made by Drs. Anstie, Dupré, and Thudicum seem to have settled the question experimentally that alcohol has a food factor. The fact is an induction from the experiments, and the experimenters agree. I have not seen the experiments successfully contradicted, nor am I aware that the results are any longer denied. These experimentations prove in a general way that nearly all the alcohol consumed is changed in the body. At least it is not eliminated as alcohol. This fact is the hinge on which swings all controversy on

this subject of the food value of alcohol. It must be clear enough to any ordinary observer that if alcohol did not have some factor of food relation which conserved life as well as poisoned it, the world would have been depopulated soon after the Noachian deluge, and the flood would not be responsible for it.

To sum up this question, I think we may say of alcohol that it is a food, or has a food value or action, limited to its power of inhibiting cell metabolism, and furnishing force as a result of its decomposition. It is not, I think, certain as yet that alcohol furnishes material for the construction of tissues, although the food barriers between the nitrogenous and carbonaceous foods are not so strong as formerly. Alcohol antagonizes the ptomaines of disease, physiologically by its nutrient and stimulant powers, but it is itself a poison to the tissues upon which, in a small quantity, it acts as a stimulant.

CHAPTER XII.

THE TEMPERATE USE OF ALCOHOL.

THE Fourth Anti-Alcohol Congress, held at The Hague, was composed of delegates from most of the countries of Europe and from America.

The sensation of the meeting developed from the fact that some of the delegates spoke, or read learned papers, advocating the moderate use of alcohol habitually rather than the practice of total abstinence. The most prominent defender of this moderate drinking theory was a physician, no less a personage than Sir Dyce Duckworth, honorary physician to the Prince of Wales and lecturer on medicine at St. Bartholomew's Hospital. Dr. Duckworth set forth at length his personal professional observations on the action of alcohol, after which he stated that it has not been proved that the moderate use of alcohol is hurtful to the people of Europe. As a matter of fact, he said, the most enlightened nations had made use of alcoholic liquors, and there is no proof that the moderate use of alcohol, in conjunction with good food, can injure the organs of the human body. On the contrary there was ample proof that such use of alcohol is beneficial. It follows, then, that for many persons complete and continuous abstinence from alcohol is

not at all to be commended. Such abstinence should not be practiced for example's sake, for the evidence is now clear that such example has never been a success.

Dr. Duckworth then suggests a remedy for overdrinking, or intemperance, which he says consists in instructing the young, as a part of their education, that the moderate use of alcohol is proper and beneficial, while its intemperate use is harmful.

The Anti-Alcohol Congress received this speech with derision and consternation as well. A dynamite bomb could not have surprised and disconcerted it to a greater degree. But it developed that the English physician had powerful and numerous supporters. Professor Sokvis of Amsterdam, one of the recognized heads of the medical profession of Holland, declared that man could not exist without a stimulant, and insisted that alcohol was a good stimulant. But he said that alcohol should be taken moderately with food, and admitted that if a man took large quantities of alcohol without food the consequences would be disastrous.

Dr. Suiedens, representing the Dutch society of medicine, and Dr. Smidt, a representative also of the Holland medical profession, supported these propositions; or rather, as claimed, these inductions. Dr. Smitz, of Bonn, read a paper to the same effect. He, however, contended that alcoholic drinks were not necessary to health, but that the use of them moderately would not cause disease.

As would be expected, and as should logically

follow, these gentlemen fixed the limits of moderation. This amount was declared to be one ounce and one-half of alcohol daily, which should be taken with the meals.

Pastor Bovet, of Berne, pronounced this standard of moderation to be a concession to the cause of temperance as distinguished from total abstinence, and declared that if people could be induced to limit their indulgence in alcohol to this standard of moderation it would close seven-eighths of the distilleries and three-fourths of the breweries, while it would seriously limit the production of the remainder.

I wish to notice the inductions of these truly eminent physicians relating to the national, individual, temperate, intemperate, and general physiological and pathological effects of alcohol.

Dr. Duckworth's induction is that the moderate use of alcohol is not hurtful to the people of Europe. He says that it has not been proved to be so. This is undoubtedly true ; and the reason is that the European nations do not use alcohol temperately. They use it intemperately as nations. If there is no example of the national use of alcohol temperately, there can be no proof or induction as to what the effect of a national temperate use of the article would be.

Dr. Duckworth may have meant that in European countries there is no proof that the class of people who use alcohol temperately receive any notable injury from it. There is no longer any

doubt that alcohol is consumed in the body. Only a small fraction of the quantity taken is ever eliminated from the body as alcohol. The inference can only be that it is oxidized in the body, and in this manner furnishes a food force. It seems to be a demonstration that alcohol in moderate quantities, and as it is consumed by oxidization in the body, stimulates cell metabolism, thereby increasing the power of the cells to absorb nutriment; or this use of alcohol aids nutrition.

Experiments also seem to demonstrate that in any given case a small quantity of alcohol will enable the same amount of labor to be done by a working man, on the same amount of food, with less fatigue and less bodily waste, as shown by tests of carbonic acid and urea, than without the alcohol. In other words, a working man, on the same quantity of food, if alcohol is added, can do more work with the same or less amount of bodily waste than if alcohol were not present. These facts certainly sustain the opinions of Dr. Duckworth and the other physicians, so far as effects on the body are produced by alcohol. There is no proof that this effect of alcohol causes any perceptible evil in a general sense upon the organs of the body. The meaning of this is that such use of alcohol will not cause degeneration of nerves or internal organs, that it will not cause fatty degeneration, and that it will not cause inflammation of the peripheral or other nerves.

To this extent alcohol is useful in daily life. It

saves other food, but with doubtful economy even in relation to the food. No man, however, can find fault with the laborer who has in his dinner pail a pint of malt liquor with his dinner, if this is the limit of his indulgence. The beer will aid his digestion and assimilation and give him additional strength and endurance.

But laborers who limit the use of liquor to this moderate standard are very few. In European countries and in America a close canvass will show that workingmen who drink this much drink a great deal more, and that those who drink less than this probably do not use alcoholic liquors.

But while I admit all these things, I claim that facts will prove that the standard of moderation, established by these physicians, of one and one-half ounces of alcohol daily, will produce inebriety. In fact any quantity of alcohol drank daily will produce inebriety in a corresponding degree. A man may take a very small quantity of morphine daily, say one-eighth of a grain, and not cause any disease except opium inebriety. That small quantity of morphine, taken daily, by its action upon cell metabolism, will enable a larger amount of work to be done on the same quantity of food. It will do almost everything that alcohol will do under the same conditions. But the man who takes morphine in this manner will increase the quantity in less than a month, and within three months, unless a guard with a bayonet is standing over and weighs out the morphine for him, he will be taking three

or four grains at a dose. These poisons cannot be taken in any quantity without causing their respective inebrieties.

It is very true, as Dr. Duckworth says, that the enlightened nations are the liquor drinking nations. But the enlightened nations are not temperate drinkers as nations. There is no such thing as temperate drinking, except by a small class, in any of the enlightened nations; the people either abstain or do not drink in moderation. Our temperate class is not composed of those who habitually drink a moderate quantity, but of those who very occasionally take a drink. They may consume an ounce and a half of alcohol once in three months but not daily. If, then, enlightenment of a nation is due to alcohol at all, it is due to inebriety and not to temperate drinking. There is no enlightened nation whose people ever limited its drinking to one and one-half ounces daily among its drinking classes. If alcohol has aided the civilization and progress of the most enlightened nations, it has done so in spite of its evil effects in causing inebriety. It has done the work by its stimulating effects, or its physiological antagonism to malarial or other germ poisons, or in antagonizing the effects of bad sanitation. Alcohol cannot produce the highest development of a nation or of a man by inebriety, or by drunkenness. No person can deny the drunkenness of the highly civilized and Christian countries, no matter what may be the factor of temperate drinking among the people.

I regard this as one of the deepest social and physiological problems in all the history of the development of races and countries. The facts as stated cannot be denied, that the enlightened nations are the inebriate nations. These nations have not taken up inebriety or alcohol drinking as a sign of decay. Inebriety and drunkenness form a part of the history of their development. They always drank and always drank to excess. No moderate drinking was ever known among them as nations. I believe the problem can be satisfactorily solved by the aid of known biological laws. I will first cite further propositions, or facts, and then try to induce the general answer or law to explain special facts.

The enlightened nations are the inhabitants of the coolest countries. That implies greater obstacles to overcome in earning a living and preserving life. The enlightened nations furnish us the history of the greatest wars. These nations likewise have suffered most from epidemics. They have also consumed the greatest quantities of alcohol and other poisons. It is a law of biology that the necessity of resisting some enemy causes development of faculties and functions. If an animal reaches a certain stage of development in any climate, where he is acclimated, has no enemies, and feeds on ready-made food, that animal will make no further development. There is no action upon him or his species or genera to cause reaction, or variation, or increased activities. His development is finished. The less

enlightened nations will show this history. They had no cold to overcome, no necessity for exertion ; their wants were comparatively well supplied. The plow was not invented by the man lying under a bread-fruit or banana tree, but by one whose ancestors lived so close to a glacier that they were obliged to rob the fur animals of their skins in order to keep from freezing, and in a country so barren that their bread must be a result of labor and invention. "Necessity is the mother of invention" and also of development and civilization.

The terrific wars of the higher nations have seemed to introduce new inventions, have forced nations into energetic activity ; activity on the defensive or, even, as aggressor, always creates something. It generally results in some new variation and development, which is an individual and national help.

Great epidemics and grief over the loss of the young and beloved have stimulated thought, activity, and invention. It has finally resulted in learning the cause of disease. If a man or a nation set out to learn, by mental and other activities and in resistance to disease, a method of preventing disease, those activities will result in discovering many things, perhaps, in addition to the cause of disease.

Man as a machine is capable of a great amount of activity and development ; but the history of nations will show that unless there is some stimulant to activity there will be laziness. If a nation is

fed without work, it will grow lazier every day, until it passes out of existence.

But national enlightenment is the price of human blood and human life. No great obstacle to easy living, stimulating because dangerous, can be encountered by a nation without much destruction of life. Probably many millions of human lives were destroyed by the microbe before science, reaching in all directions, stimulated by a desire to live and the necessity of destroying the cause of disease, finally found the microbe and established the science of microbiology.

Wars have killed millions of people, but have done much towards human development and national enlightenment. The necessity of invention to avoid destruction, or for conquest in war, resulted in a diffusion of knowledge, the mingling of blood, brawn, and brain, and the moral development of men and nations. Human liberty is the result of war and the shedding of human blood. It appears that human development is secured by human activities that result from necessity; unless some exigency arises there will be no activity. It also appears that all great human stimulants to activity, or the conditions imposed upon humanity to overcome, while they have resulted in general development, have also cost the loss of individual life.

I regard alcohol, in its relation to the enlightened nations, as one of these fatal obstacles imposed upon the people to stimulate resistance and thereby increase national intellectual and moral activities. Al-

cohol has not by direct action made the nations enlightened, nor developed the physical, moral, or intellectual type of man. It has developed man, not as his friend but as his enemy. In this way alcohol is an associate of enlightened nations. Alcohol has stimulated scientific research. It has created many scientific and moral organizations, whose object is to elevate the human moral character and to resist alcohol and other moral evils at the same time; thereby much mental and moral development is promoted, which furnishes a factor in the total enlightenment of a nation.

Like wars, epidemics, cold, storms, famine, and other such obstacles, alcohol has slain its millions. It has put the stamp of inebriety upon the brain of nations. It has debauched and ruined, debased and made drunken; but it has stimulated resistance and thereby increased human activity. It consequently ranks as an enemy, which, in being conquered, has aided the enlightenment of the Christian nations.

By having reached a sufficient mental, moral, and physical development the enlightened nations can exist as a full grown man may, without further development of such character. The man struggles with obstacles until he is learned and rich, when he settles down to enjoyment and takes time for more purely intellectual and moral ease. The enlightened nations have raised agriculture to its highest development. The diet of these nations is now far in advance of that of the man lying on his back under the bread-fruit tree, and their development is

much greater mentally. Wars grow less and more unfashionable, and the prospect now is that the enlightened nations have conquered epidemics. The logical consequence is clear. The enlightened nations do not need alcohol. Inebriety must be cured. There is no more need of prescribing any daily moderate quantity of alcohol for healing people than there is for advising an occasional duel because wars are a part of civilized history. I do not mean to say that the day of abstinence from war, or alcohol, or other great evils, has arrived. I am simply suggesting the relation of these things to human progress and indicating the final result. To me the lines I have pointed out seem clear. I think the explanation makes plain the true relations of good and evil in this world of human development. Conquering evil underlies human development.

Dr. Duckworth, in order to bring about temperate drinking or to insure the adoption of his standard of moderation, proposes to educate young people, as a part of their school training, that alcohol in small quantities is harmless and useful, but its dangers depend upon taking large quantities. I confess surprise at this proposition from so learned a medical man. Certainly Dr. Duckworth would not give such advice were he more thoughtful. These facts as he proposes to teach them are partly true. It is true that if any person is positively limited to one and one-half ounces of liquor daily for a life time, no harm will come of it; but education will never bring about such a result. Young per-

sons, eight out of ten, who adopt the practice of taking this moderate quantity will shortly be victims of inebriety. A craving for liquor will be set up and more will be taken. In a few months, more or less, these persons will be inebriates. Education will not bring about this result. In short, if the young people of a community adopt such a course, within a year nothing but imprisonment and surveillance will keep them from drinking alcohol as the drunkard drinks it.

Education does not control the will. The brightest minds, the greatest intellects, the virtuous, the godly, are alike brought low by alcohol, no matter how small the beginning. It destroys the will, or overcomes it by a more powerful craving for drink. It is the craving for alcohol that keeps up the drunkenness of the inebriate. It is probably never the result of viciousness or lack of early education on the subject of the evil effects of alcohol.

But I do not deny that there are moderate drinkers. I claim, however, that these people are all moderate-drinking inebriates if they drink habitually, or every day, or if they take alcohol regularly with meals. If a person begins taking one and one-half ounces of alcohol with daily meals and continues the practice a few months, he may observe the following results: If he omits the alcohol for a day he will miss it. He will feel a craving for something. His digestion and strength will be below normal. This means that the digestive organs and nervous system are educated to

digest food under the stimulus of so much alcohol. If the alcohol be withdrawn, the digestive forces and general physiological measure of force will be diminished accordingly. To this extent such a person is an inebriate. His digestion may recover its normal condition in time if the alcohol is abstained from, but until the craving for liquor is gone the man is an inebriate.

There is, however, a class of moderate drinkers and there is a method of making them. The method is not by education, by tears, protests, by prayers, by control of the will. The descendants of inebriates may be moderate drinkers, but none others can be. No nation can adopt alcohol, with its necessary inebriety, without the operation of the laws of natural selection. When a nation proceeds to drink poison, the law of natural selection proceeds by its own method to rescue from the gutter a class of moderate drinkers. The operation of the law is as follows: Generation after generation are inebriates, because drinking causes inebriety. But as the drinking proceeds and the generations are born, nature creates a tolerance to the poison. In time there will arrive a generation who can drink alcohol moderately without causing drunkenness or a craving, because heredity has transmitted to them a certain degree of tolerance to the poison of alcohol. There is no other method of producing a class, or a race, or a nation of people who can drink alcohol moderately.

Dr. Duckworth has doubtless observed many

people who do drink his moderate dose of alcohol daily. Perhaps they do so continuously. Every nation can furnish such a class after many years of the general consumption of alcohol.

Suppose Dr. Duckworth were to educate school children to understand that having smallpox, scarlet fever, and other germ diseases moderately is far safer than having more severe attacks. This would be true, but would be of no use.

But nature produces a class of people who have all these diseases lightly, or are entirely exempt. One attack of a disease gives immunity from further attacks of the same disease. In time, heredity, by transmitting this acquired tolerance to the poison of a disease, creates a class who are partially or wholly exempt, or who can indulge with moderation.

CHAPTER XIII.

THE INEBRIATE STOMACH.

THE stomach and its accessories of nerves and nerve centers are of great importance, whether considered from the physical or moral standpoint. The ancients believed that the genius of life inhabited this organ, or, rather, the entire abdominal region. This idea arose naturally from the sensations of hunger and thirst, which feelings are referred, subjectively, to the stomach.

Hunger is the great fundamental desire or passion of the living animal kingdom, if we include the differentiated feeling of thirst. It would seem to be true that all human desires, relating to life, to society, to business, to all that stimulates people to earn a living, to live well, gain fame, wealth, and station—all these desires are only differentiations of and developments from the original and primal feeling of hunger. In order to live, all living things must have food. The absence of food creates the feeling, the desire, the distress, or the hunger, as it may be; this great inherent necessity and inherent sensation, when experienced, will start the lion out in quest of prey; animals of great and low degree, of whatever order, genera, or species, must

make the search for food when hunger makes the demand.

It is provident to save a little something for a "rainy day." This is one of the common axioms of the conduct of life. It is also one of the first lessons learned by that division of the animal kingdom which can boast of a cerebrum. Hunger, it is true, can exist in species which may not have a stomach, and that may be so undifferentiated as to have little other than a nerve center controlling an amœboid movement into space in a blind search for something that can be used as food; but wherever such animal exists, having the power to swallow its kin or enemies, with a nerve centre to control the function, there is also the feeling of hunger.

I am aware that the same substratum of hunger and thirst is not in reality located in the stomach. The sensation, however, is referred to this region. The human affections are referred to the region of the heart; but both these fundamental passions belong to the sympathetic nervous system and nerve centres. It is true, however, that originally the sensation of hunger was more nearly associated with the stomach; it is a fact now that the feeling originates from an empty stomach and abstinence from food. It is confessed, also, that the feeling of hunger and the inhibition, or cessation of the feeling after taking food, were originally taught the nerve centres by the stomach. The nerve centres were educated to feel hungry by an empty stomach. They were trained to revert to a condition of inactivity during

the period of digestion. But it is true that after this education is accomplished the nerve centres will automatically assume the condition which speaks hunger to consciousness, even if the stomach of the animal is removed. It is only by eating or satiety, over eating, and nausea succeeded by abstinence from food, that the regular and automatic periodicity of hunger occurs, or was originally caused. Sickness relating particularly to the stomach will prevent this action of the nerve centres; which shows conclusively where the centres obtained their education and under what dominion they still exist.

We find that in civilized life the passion of hunger is a developed, regular, and ethical sensation. The custom being three meals daily, it follows that the nerve centres are educated to automatically call for the morning, noon, and evening repasts. The savage and the wild beasts gorge when they can and suffer the pangs of hunger when they must.

But I may refer to the relations of ethics and hunger. A beast of prey certainly cares very little about what or who may be its victim. Wild beasts will destroy any animal for food when pressed by hunger, except their own offspring and associates; but they will consume such of these as may by accident receive an injury. Ethics is at a very low ebb among the several tribes of cannibals; but cannibalism among the highly civilized and cultured is not unknown, when starvation has dictated the moral conduct. I mention these facts merely to indicate

the power exercised by the stomach and its associate nerve centres, under the press of passion, over the mind, over ethics, and over the moral conduct of the individual.

It is well known that what we acquire last in our human development we lose first when adversity overtakes us. In relation to society and human ethics, when disaster, loss of property, or loss of reputation occurs, our altruism, or regard for the rights of others, leaves us. Starvation takes away human regard for other human life.

What wonder is it, then, that the passion for drink—the craving for liquor, a disease of the nerve centres, or a passion given them by a debauched stomach which has been periodically poisoned by alcohol—what wonder is it, when the nerve centres, automatically responding to the period of this automatic craving, cause the inebriate to lose his self control, his love of life, of sobriety, his self respect; and, at the demand of his stomach and its accessory nerve centres, to sink into a fit of alcoholic degradation?

But this brings up the general question of the influence of the stomach and its nerve centres upon the mind and human conduct in disease of these organs. It is conceded that this is one of the causes of insanity. All men know the influence exerted over the temper and conduct by dyspepsia. In my opinion there is no sensation so unbearable with any degree of fortitude or which so unfits one for all appreciation of life and the glory of earth as

nausea. The sea-sick passenger retires to his room. As the nausea increases his ambition of life and regard for life fade away. He recks not if the ship becomes swamped, nor fears he if the storms rage, nor however great the danger. Nausea is the extreme of hunger. One converts the cultured æsthetic, refined man or woman, into a fiend who will range the earth like a beast of prey, without conscience, without regard for human or other life; while the other extreme prostrates its victims with the paralytic supineness of despair.

With this general knowledge of the relation of the stomach to the human mind and conduct, I will now refer to the inebriate stomach, or to inebriety considered from the standpoint of the stomach and its accessory nerves. In this study I do not propose to consider the question of the remote diseases produced by alcohol upon the coats, glands, or tissues of the stomach. These conditions are results and not causes of the craving for drink. Their existence does not cause drunkenness, nor can their cure prevent it; but the cure of inebriety can be accomplished, no matter in what pathological condition the stomach may be as a result of alcoholic poisoning. But I wish to learn the real relation of the stomach and its nerve centres to the phenomena of inebriety—the craving for drink, the debauch, the succeeding disgust for liquor, the period of sobriety, and the returning craving for drink.

I have frequently stated that there is no cause for inebriety but alcohol. No other disease is in-

ebriety. No heredity or other disease can cause or is inebriety. Any disease, or perhaps anything else, may lead a person to begin drinking, but no agent except alcohol can cause inebriety, nor will the cure of any other disease associated with it or caused by alcohol, as a result of inebriety, necessarily exert any influence whatever, either for or against the craving for drink.

In the majority of cases, when a person begins to drink he soon experiences a debauch. In many cases the first drink is followed by a drunken fit. This is especially true with those people who were made inebriates during childhood by the use of liquor. This debauch is usually followed by a drink or two the next day to steady the poisoned nerve centres. But there is a loss of appetite and of digestion, lasting a day or two, while in all cases a nauseating disgust for liquor is the result. The stomach and its nerve centres have received their first lesson.

Perhaps, now, the coming inebriate resolves upon reform; his remorse prompts him to say that he will never drink again. The irritated stomach and nerves protest by the pain of atavistic change; external influences urge upon the mind the necessity of good resolutions.

This causes a period of sobriety. But the time may come when all this is forgotten. There may be no craving for liquor, but an occasion arises, social or otherwise, when the debauch is repeated. The stomach and nerves are put through another

experience of acute poisoning, with the usual method of a nauseating recovery.

After a few such repetitions a habit is established and the inebriate education of the stomach and nerves is accomplished.

The education of all nerve centres is accomplished in general, as well as in any special manner, by frequent repetition of any action. Education of any character is a product of the same repetition. Whatever is acquired by any nerve centre, or by the whole mind, is learned by this same method. We gain the knowledge of any act, any science, or the relations of any fact by repetition. When a child learns the alphabet or the multiplication table, he masters it by repeating the letters in connection with printed or written type, and by repeating the table. Committing a text to memory is accomplished by repeated readings.

The converse side of this fact is that the repetition of any act, or of any impression whatever, must educate certain corresponding nerve centres after this given manner. When the centres are thus educated and begin action and conduct for themselves, or when they act at all, they act after the manner of their education. They will perform their functions of life as they have been educated to act and will act in no other way unless they first receive the new form of training or education. We all know how difficult it is to unlearn anything we have been educated to understand and to put a new

learning in its place. Old ideas are rooted and they are difficult to remove.

Repetition of the act of drinking alcohol creates an education of the stomach and its nerves. They are taught to experience a periodical craving for liquor, a debauch more or less prolonged, a succeeding nausea and disgust, a rejection of drink, and a period of total abstinence.

When this education, or training, or inebriety is established, the action of the stomach and nerves has become automatic. The meaning of this is that the nerves act after the manner of their education without prompting. They adopt this method or conduct as a part of their functions, and when they act at all will exhibit this automatism or habit.

The course of inebriety is now established. The conduct of the stomach and nerves and of the person now exhibit the characteristics and the life of the inebriate. The stomach is an inebriate as well as is the individual. The result of this condition is periodical drunkenness, resulting from an appetite or a craving for liquor. But one of the most remarkable features of the inebriate stomach is the fact that the automatism of the inebriac education will cause the phenomena of inebriety, periodically, even if the alcohol is abstained from. The attack will begin with loss of appetite, indigestion, and seemingly entire cessation of the natural functions of the stomach and nerves. If food is eaten it will cause the distress incident to indigestion, and is

usually rejected by the stomach. There is more or less pain in the gastric region, while the duration and general symptoms resemble an attack or a paroxysm of inebriety. The pain and indigestion will disappear if alcohol is taken at any time during the attack. But if the inebriate abstains by effort of his will, the natural course of the paroxysm will continue. At the proper time the disgust and nausea will appear, with more or less corresponding disturbance of the brain; there will be a sleepless night or two; then, in the usual manner, the functions of the stomach will be restored, and stomach and nerves will resume the natural order of things belonging to the period of sobriety.

This is the experience of nearly every case of inebriety, though often overlooked. Many inebriates, struggling for reform by effort of will, are conquered by the periodical paroxysms of the stomach. When the fit of pain and indigestion comes on, the inebriate may resist for a day or two, but generally he yields to the demand to "take a little wine for the stomach's sake." The wine restores his appetite and digestion; but this only prolongs the agony. The inebriate knows very well that, resist as he may, if he drink at all he must drink to debauchery and until his stomach will no longer retain the poison; nausea, vomiting, tremens, delirium, and remorse end the paroxysm. Any escape from this formula is an exception to the rule.

This is the period when, in extreme cases, the

feature of delirium tremens occurs. This happens always in greater or less degree in every paroxysm of drinking. It also occurs to a degree in the attacks of automatic stomach inebriety, even when no alcohol is taken.

The clinical history of an inebriate generally shows in relation to the stomach and its nerves that several years of drinking may be required to establish an automatic inebriety of the stomach. During the first few years the stomach maintains its integrity to all appearance during the period of sobriety. In these cases the craving for liquor does not apparently occur until the first drink is taken. This sets the whole machinery of inebriety in motion and initiates a paroxysm. The result is a fit of drunkenness. But after a few years the victim experiences what are called "bilious attacks." He will be suddenly taken with painful digestion; perhaps his stomach will refuse food altogether. If food is taken it does not digest; a fermentation with acidity and gas formation will result. If the patient does not drink he sometimes consults a physician, who treats him for dyspepsia or biliousness. The careful observer will note in these cases that if no food is taken there will be no biliousness; also, that at the termination of about the duration of the usual drunken fit the stomach, after rejecting all food and drink for a day or two, will regain its accustomed usefulness.

This automatic stomach inebriety will continue

with the inebriate until his inebriety is cured. No matter if he abstains from drink for a year, he will experience his "bilious" attacks as regularly as he formerly drank. I have seen hundreds of such men who were settled in the belief that they were victims of malaria, or cancer, or dyspepsia, or liver disease, or other organic lesion, and who consulted many physicians for relief. Of course stomach inebriety may be associated with organic disease of the digestive or other organs, but the symptoms of the inebriety — the periodicity, the stomach pain, the indigestion, the succeeding vomiting, the craving for liquor, the recovery, all with or without treatment, — these symptoms are entirely distinct from and independent of the symptoms of any organic lesion which may be present.

In later years and after his stomach and its nerves have been taught so thoroughly the lesson of inebriety that it is a second nature, the inebriate will attribute his drinking to his dyspepsia and stomach troubles. He is conscious that during the period of stomach sobriety and good behavior he has no craving for liquor; that as soon as the fit of indigestion attacks him drinking will relieve him and re-establish for a time the functions of the digestion. For this reason he thinks he could resist the craving for liquor if his stomach were all right. In a sense he is right, but in reality he is not, because his so-called dyspepsia is a result of long continued inebriety, and is caused by an inebriate stomach.

The cure of inebriety cures the inebriate stomach. Dyspepsia of this character is no longer experienced. If, however, there is organic lesion or other disease of the digestive organs, these things will pursue their symptomatic course without change.

CHAPTER XIV.

THE PATHOLOGY OF INEBRIETY.

INEBRIETY means a lesion of the nerve centres of a peculiar character, and, perhaps, of the cells and nuclei of other tissues, which is caused by alcohol. The symptoms caused by this lesion are a craving for alcoholic drink, which is periodical in character and which leads to times of drunkenness, followed by seasons of total abstinence and sobriety. I regard the period of sobriety as a part of the disease, or as a symptom of the disease.

The lesion of the tissue cells and nuclei is the immediate and direct effect of alcoholic poisoning. It is true that there are further and remote lesions due to alcoholic poisoning, as various degenerations of organic nature, of nerve centres, nerves, and other organs ; but these lesions form no part of the craving for drink, or the inebriety. The craving is due to the law that a poisoned tissue demands more of the poison, or its continued or periodical presence.

The lesion of inebriety is not demonstrable by microscopic tests or examination. The remote lesions, or the alcoholic degenerations, are verifiable by the microscope.

That alcoholic poisoning, however, produces a craving for liquor which a majority of alcoholic in-

ebriates are unable to resist is a fact of observation and testimony. Some inebriates are depraved morally and do not desire reform, but the greater number most earnestly desire to be free from the bonds of drink; although in rare cases only does the will succeed in resisting the importunate and periodical craving for alcohol.

The questions to determine in a study of inebriety are:

(1) The character of the lesion caused by the poison.

(2) The cause of the inebriate's craving for liquor.

(3) The periodical or rhythmical character of the craving and other symptoms.

As I said, there is no method of establishing the science of the pathology of inebriety except by deduction of special facts from established general laws of poisoning in relation to the general laws of biology. These general laws of poisoning I will state to be as follows:

(1) Any given poison, taken habitually, in quantities not large enough to cause death, results in causing a tolerance to the poison on the part of the poisoned tissues, and a demand on their part for the presence of the drug.

(2) When a person accustomed to the use of a poison abstains from any cause, the tolerance to the drug, acquired by chronic poisoning, as well as the craving for the drug, disappears.

The action of all poisons proves these propo-

sitions, or, these propositions are general inductive laws founded on the verified facts of the action of the poisons.

No fact of poisoning is better known, or understood, or generally observed than is the fact that the habitual use of morphine creates a tolerance to the drug and a craving for its presence. People who take morphine necessarily begin with the average medicinal dose—say one-quarter of a grain. From this small beginning the inebriate gains such a tolerance to the poison that half a drachm may be taken at a dose. By the same rule inebriates take large quantities of ether, chloral, hasheesh, and other poisons.

The virtue of inoculation for the prevention of disease depends upon the law of developing tolerance to poisons. The virus inoculated is a milder type of the microbe causing the disease, which furnishes a less quantity of the poison of the same kind. This smaller quantity causes the establishment of a tolerance to the poison of the disease, and thus prevents the disease.

The second general law of poisoning is also a fact of observation. A morphine user who has abstained from the drug for a sufficient time will lose the power of tolerating the usual poisonous dose. The immunity from disease, given by vaccination or by an attack of disease, is lost after a longer or shorter time. Vaccination, as is well known, must be frequently repeated in order to be efficacious.

It is true that in disease poisoning the craving

for the poison is not observed; but that could not be expected. In creating inebriety the one debauch, or one dose of morphine, is not sufficient to cause the lesion which creates the craving. One attack of a disease creates an immunity, and one debauch, or one dose of morphine, will create a corresponding tolerance; but in the use of these poisons a repetition of the alcohol or morphine is indulged in voluntarily, until the condition is created which does demand the craving for the drugs. So far as is known, people do not voluntarily take a disease more than once as a diversion.

The explanation by the general known laws of biology must account now for these phenomena of poisoning. An understanding of how the tolerance to poison is established will show the character of the lesion caused by alcohol in inebriety, which is the first proposition for consideration.

This question necessarily brings us face to face with the one of immunity from disease, acquired by having a disease naturally, or by vaccination or inoculation. The last suggestion made on this question by pathologists is that of Metschnikoff, who has formulated a theory of immunity, based on the fact that in disease himself and other observers have seen, the white blood corpuscles absorb or consume the microbes of the disease. These organisms, the white blood corpuscles, are called phagocytes, and this theory is the phagocytic theory.

Of course, this observation proves nothing except that the microbe enters the white blood corpuscles.

If by this means disease is brought to an end and immunity secured to an animal in relation to any given disease, then how did the white blood corpuscles acquire their immunity? These organisms are subject to the same biological laws governing nutrition, multiplication, and special function and development that govern all other living things. If there is some other method than this by which the white corpuscles get an immunity, perhaps it also governs all other cells, tissues, organs, and animals. At any rate, the phagocytic theory of Metschnikoff cannot stand.

But all organisms — cells, tissues, organs, animals, and plants — are subject to the law of variation or adaptation. A change of any organism whatever, in relation to its environment, must result in variation of its structure and physiology, which adapts it to the change of environment; such variation and change must result in the death of the organism. When any organism is poisoned, therefore, it must, if habitually poisoned, acquire a resistance or tolerance through variation, or a change in type of its structure and function.

The law of variation and adaptation, or change in type of structure, is a biological law which, as a factor of Charles Darwin's grand generalization known as natural selection, is known to be a property of all organic structure and organisms. It is this law of variation and adaptation which gives Metschnikoff's phagocytes a sufficient immunity to enable them to make a meal of virulent microbes;

it is also this law which gives the morphine eater an increased tolerance to the poison; which brings disease to an end after a definite duration of time, and which, also, gives immunity to disease, as a result of the ptomaine poisoning of the microbe.

The pathological lesion of inebriety, then, is a variation of the tissue cells, notably of the cerebro-spinal system; which change in type of the cell, though microscopically and macroscopically unknown, is not fully verified by deduction to exist. There is no other way to account for the action of alcohol as a poison and for the symptoms of inebriety—the craving and the periodicity of the paroxysms of debauchery, with the periods of sobriety; all of which can be readily explained by this and associated verified biological laws.

A logical question here arises: What is it that determines the variation; what originates the increased energy? Individual energy, activity, and development depend upon opposition; there is very little energy without the stimulus of conflict. Those nations have made the greatest advance which had the most formidable obstacles to overcome. The biography of great men tells much of the story of poverty and self-education. The stimulus of opposition or resistance seems to be a condition of organic activity. The activity in relation to the opposing force is of the character of resistance. Something to do means something to overcome. Work means resisting something, or laboring, or expending energy in resistance to something. There

is no way other than this of exciting energy or of measuring force, except by comparison with resisting force.

When a nerve cell encounters alcohol it is poisoned; it meets a force opposed to its functions, and is either destroyed or is stimulated to resistance. Its functional activity is, therefore, increased. It can manifest an energized activity only in the direction of its natural physiology. If not overcome by the poison, then the increased cell activity is shown by an increase of its special function and by an increase of its general functions of nutrition and multiplication. But this is not all; there is an increased energy displayed in the direction of development, which development in the cell means a variation of structure that enables it to tolerate to a greater extent the poisoning of alcohol. It is an observed fact that tolerance to alcohol is increased during a debauch. The inebriate, when he begins a debauch after a period of sobriety, has lost, to a great extent, his acquired tolerance. Very likely he will drink half a pint of whisky during an evening, when he will sink into a comatose sleep for the night. Next morning his craving is imperative and the tolerance greatly increased; for he will take a half pint of liquor before breakfast without drunkenness, with no further effect than to satisfy the craving and steady his nerves.

The second question, the cause of the inebriate's craving and its periodical character, can not be answered. We understand the craving to be the de-

mand of the poisoned cells for more poison. This demand is a function of the cells, which is conveyed to consciousness in the same manner as hunger and thirst, and is fully as imperative. Hunger and thirst can overcome the will, the moral character, and the resistance of the individual. The craving for alcohol is no less powerful. It is practically irresistible. This rule holds good in all inebrieties, but perhaps is most intense in the morphine inebriate, who will not hesitate at any moral or other obstacle in the way of his supply of poison. That the craving exists is a fact of observation, sufficiently verified by testimony from the subjective side of the question. The question is, why do poisoned cells have this craving? It is suggested that the increased activity of the cells, in the direction of resisting the poison, should create a disgust instead of a craving for liquor.

The demand for alcohol is doubtless due to the pain or difficulty of variation under the change of environment brought about by withdrawal of the poison. The change is too great for the ability of the adaptation required, or the new variation that must be undergone. The cells have become adapted by variation to exist and carry on their physiology, subject to poison. The latter has become a factor of environment; it is, therefore, a factor of their life, since life is an adjustment of the inner relations of things to those of the environment. The change demanded when the poison is removed is imperative and difficult, and while the remote

results are in every way better, the change is nevertheless difficult and more or less painful.

A study of natural selection, so-called, in relation to social life, as well as in physiology and pathology, will be found to correspond with the rules here given relating to increased activity under the stimulus of antagonism, to a demand for the conditions which have caused a new adaptation, and the difficulties of variation as well as of a new adaptation, no matter how much better the remote results may be.

The drunkenness of inebriety is periodical in character, or it is rhythmical, like all other phenomena of life and nature. It is true that in many inebriates the rhythm is short; in some it is so very short that the period of sobriety is difficult to appreciate; but it is, nevertheless, a factor of all cases of inebriety. The duration of sobriety may last from a few hours to a few weeks or several months, or even two or three years.

The average duration of the sober period in the typical inebriate is two months. During this period the inebriate is a total abstainer and has a delusion that he is reformed and will never drink again. Clinical history shows, however, that the debauch, the craving, the reform, the remorse, and period of sobriety, all appear at the appointed time.

There is no more satisfactory method of accounting for this phenomenon than the explanation given by the physiology of automatism, which I have described at length in a previous chapter.

All trades are learned and performed under these laws of automatism. The apprentice makes many tedious, labored efforts to adapt mind and muscle to perform work with a definite object and end. He is being educated or trained. In time, when his trade is learned, he performs the work in a great measure without conscious volition. The piano player, type-writer, watchmaker, as well as all other workers go through this experience. When they have learned their specialty, whatever it may be, the higher brain centres, the nerve centres, and the spinal cord have all learned the trade, and work goes on with the minimum of the activity of conscious direction.

The young man who mounts a bicycle for the first time is acutely conscious of every effort. But he learns to balance himself and propel his machine by many conscious repetitions of the activities that are required. In time the spinal cord and nerve centres, sensation and reflexes have learned the act required; when the rider maintains his seat without conscious effort, by means of automatism.

Alcohol causes inebriety; there is no other cause of alcoholic inebriety. When a man begins drinking, he may drink to intoxication; at least, he does sooner or later. He drinks to drunkenness, sleeps the slumber of coma, awakes tremulous and disgusted, repents, has remorse, and declares he will not repeat the disgrace. He then abstains for perhaps two or three months. But certain circumstances lead him to repeat the debauch. Sooner or later he

repeats it again. This man, in this manner, becomes an inebriate. He educates his automatism — nerve centres, nerve and tissue cells — by these repeated experiences to crave liquor, to reform, to abstain for a time. After a sufficient education the work goes on automatically. At the appointed time the craving asserts itself; there is a demand for liquor; a debauch is the result, followed by disgust and a period of sobriety.

Now to understand this matter of impression, or automatism, I will cite some instances which are familiar. You know that any object, seen by the eye, transmits to the brain and mind an idea of the object. The image of the object is focused by the lenses and humors of the eye upon the retina, which receives the impression. This impression is a veritable something created there by the rays of light. It is a photograph and can be seen objectively. Furthermore, any impression so made will remain for some time as a picture upon the retina. The mind sees nothing but this picture; but all ideas of the mind relating to the picture are referred to the object itself. We think that we mentally see the object; but we only see the picture.

The fact that impressions are more or less lasting is taken advantage of by magicians. The prestidigitateur takes a coin and presses it firmly in the palm of a person's hand, continuing the pressure a few moments. Then by his "sleight" manipulations he removes the money; but the person says it is still there because he still feels it, as he thinks.

He feels it long enough for the purpose of the magician, for the reason that nature requires some time to remove the impress. The impress or stamp made by the money on the skin can be seen objectively as a print; the mind, through the sensory nerves, perceives it more or less definitely. If you watch the impress made upon the skin in this manner you can see that it remains for a time before the physiology of nature removes it.

This phenomenon is called organic memory. In fact, it is all there is of any kind of memory. All mental impressions are made in this manner; the brain tissue is so constructed that no mental impression made upon the brain is ever lost. It remains there until the tissue of the brain is destroyed or built over. These mental impressions are feelings, or ideas, or thoughts, or emotions, or desires, every one of which becomes a part of the brain. The brain carries it and carries all of them as a part of itself. Mental impressions so made upon the brain are pictures of experiences and a record of the mental life. They are not photographs; but they are stamps. They are not painted on the brain tissue with a brush; they are cut in with the graver's tool, as words are cut into marble with a chisel.

The craving for drink is graven into the brain tissue. The desire is a part of the physiology of the brain. When the inebriate reads his own desires he sees a hand writing on the white walls of his brain, cut deeply by the chisel of disease; in-

terpreting the message he learns that his chief desire is a craving for drink. No effort of his can erase the letters. He may not drink; but the letters of his desire are still there. Above the impressions of his love of family, of religion, of life, of friends is written this stamp of alcohol. It demands satisfaction. Before he prays he must drink. King Alcohol has put his work upon this brain. The day's life must be begun with drink, continued with drink, and ended with the coma of debauch.

If the impression made upon the brain by alcohol and which causes the craving for drink were in a position where it could be seen, it would be as demonstrable as the impress of the coin in the palm of the hand or the picture stamped upon the retina.

Suppose an intoxicated man commits a crime; thousands of them do, and, in fact, the chief criminals are inebriates; the criminal is caught while yet intoxicated and locked up. The next morning he is brought before the justice; but his craving for drink is his ruling passion. He begs his jailer for a drink of liquor and is refused. He is forced to assume an attitude of sobriety; yet the craving for liquor burns his brain like a red-hot brand. He is arraigned, bound over, and placed in jail. After a time he is tried and goes to the penitentiary for a term of years. The craving for that drink never leaves him during his term of imprisonment. When he is discharged he makes for the saloon, gets that drink, and ends in a prolonged debauch, in which,

perhaps, he repeats the crime for which he has served a term of punishment. The impression made on the man's brain by alcohol never left him during his term of imprisonment. This is the clinical history of crime in relation to inebriety.

If enforced abstinence, prison discipline, or moral and religious instruction could cure inebriety, then certainly it has been most thoroughly tried. But I have never known such treatment to effect a cure; in fact, it is an exception to a rule that punishment ever cures vice. On the contrary it seems to develop the criminal character — inebriety and all.

CHAPTER XV.

PATHOLOGY OF INEBRIETY AND ITS RELATIONS TO HEREDITY.

LITERATURE on the subject of inebriety, alcoholism, and temperance, as also on the results of intemperance, is abundant and somewhat erroneous. Some of it is written by physicians and biologists; yet much of it is the product of persons whose motives are above reproach, but whose observations are somewhat superficial and prejudiced.

A misunderstanding of this question — the pathology of inebriety — has led to a confusion of terms. The true definition of inebriety is a craving for alcoholic drink. The meaning of alcoholism is the remote as well as the immediate effects of the poisoning of alcohol. The first effect of alcoholic poisoning is a paresis of nerve centres, which includes the brain and spinal cord, and is recognized as intoxication, or the condition of drunkenness. The person so poisoned is drunk. The next effect, or the result of repeated debauches, is to cause a disease of the nerve centres, which induces a regular periodical craving for liquor, that results in drinking and a debauch lasting for a few days or weeks. The more remote effects of alcohol consist in the general pathology of degeneration or schlero-

sis of nerve centres, nerve fibres, nerves, and certain other degenerative diseases of other organs, as the liver, stomach, etc.

But much of these remoter lesions are greatly in doubt so far as the direct action of alcohol is concerned, as other causes of disease — the microbe and its poisons — are so closely associated as to be practically inseparable. The true relation of alcohol poisoning and ptomaine poisoning is, most likely, that the long continued action of alcohol causes a weakening of the resisting force of the tissues to the microbic invasions, thus producing mycotic degenerations ; the alcohol standing in the position of a remote or secondary cause.

One of the great laws of thought, mind, physics, physiology, and pathology is that like causes, meeting with like resistance, will produce like results. There is no literature so destitute of a knowledge of this law as the earlier literature of medicine, especially relating to the causes of disease. In medical literature, up to twenty years ago, the single supposed cause of disease, "cold," was capable of producing the phenomena of fever, inflammation, degeneration, tumors, indigestion, consumption, and numerous other unlike results. Later literature, since the discovery of the microbe, has given each distinctive general pathological lesion its specific cause ; so that the rule of etiology now is that the existence of any special disease suggests the name and nature of its special cause.

Inebriety has a single cause, which is alcohol.

The drug poisons the tissue cells and nuclei, principally those of the nerve centres; the result is inebriety, or a craving for alcoholic drinks. Any condition or circumstance of life may lead to or serve as an excuse for beginning to drink; but no person ever begins to drink because he has inebriety. The disease must be acquired by every one who has it; every person who drinks because of inebriety acquires the disease by drinking. The vice of drinking is limited in all cases to all persons when they begin drinking, and before they are diseased and have inebriety. When the disease is established, however much vice there may be in the practice or habit of taking strong drink, the habit is nevertheless a symptom of disease. It is vicious ignorance to drink water containing typhoid bacilli; but the fever, the local lesions, the ptomaine poisoning, the thirst, etc. are symptoms and conditions of disease. The craving of inebriety for alcohol is no more controllable by the will than is the high temperature of a fever. The high temperature is rhythmical, but so is the craving for alcohol in inebriety, and each is a symptom of disease.

The pathology of inebriety, like all other pathology which has the casual antecedent of a poison, is composed of symptoms and an underlying lesion of the histological structures. The tissue changes which follow a debauch, and are represented as inflammation, congestion, effusion, etc., are not the changes or the pathological anatomy of inebriety. The changes in the structure of the nerve

centres are not known microscopically, but are inferred from the known laws of physiology and of the action of poisons.

The symptoms—the craving, the disgust for drink, and the prolonged period of entire sobriety—are all symptoms of the disease, and each equally depends upon the underlying pathological automatism of the nerve cells and centres; all of which, I may say, is now clearly understood and is explicable. It is known now that inebriety is a disease, that the lesion is pathological automatism, or an education of the nerve centres in the experience of poisoning. It is known why the craving is periodical and why it is followed by disgust and a period of sobriety. The symptoms are explained by the nature of the lesion of the nerve centres.

In order to explain the nature of inebriety I will apply the known laws of poisons and poisoning to the phenomena of drunkenness and form a deductive science of the pathology.

I will say that a rule of poisoning which is verified is that any poison, taken at intervals in poisonous doses, from habit or other reason, always causes an increased tolerance to the poison in question on the part of the tissues poisoned. This tolerance is not acquired passively. It is a product of an increased activity of a specific character on the part of the poisoned cells. It is no doubt a change of molecular type, or arrangement of the atoms of the cell molecules, and is a variation of structure resulting from a change of environment

which necessitates a new adaptation on the part of the cells.

The tolerance to poison, under this law, implies a variation on the part of the organic structures and the life of the tissue cells. Natural selection is at work, by the usual methods for the preservation of life and organic forms, under changes of environment by the variation of type which causes adaptation.

But an explanation can be given of the periodicity of the debauch in inebriety, or the craving and its periodical manifestations. The debauch is due to the return of the craving. It is also true that during the period of sobriety the craving is absent. I will explain, then, by the established general laws of biology, as applied to pathology, the reasons for the existence of the craving, its nature, and its periodicity of return and absence, or disappearance. The existence of the craving for drink in the inebriate is a verification established by the testimony of all inebriates. The same law holds good in all other inebrieties caused by other poisons, as arsenic, chloral, opium, hasheesh, and ether. The law of inebriety, produced by these drugs and alcohol, is that the poisoned cells demand the presence of the poison. The craving is the call of the poisoned tissues for the poison.

Examining these facts by the light of biology we see that the pathological condition which explains the craving is the difficulty that waits upon variation in organisms which undergo a sudden

change of environment and are compelled to adopt a method of adaptation.

The biological history of species shows that the new conditions resulting in a change of type to suit them are attended with difficulties which imply greater or less pain. When tissues have acquired an adaptation to a certain daily amount of poison, if a portion of the poison supplied is reserved, a new condition is presented which demands a corresponding change of type and adaptation. This change is atavistic in character. It would appear, then, that the craving for alcohol felt by the inebriate, which is a symptom of his disease and which compels him to drink, is the pain of variation. The law of nature would appear to be, as understood by the inspired writer of Genesis, that pain waits upon the birth of individuals as well as upon the birth of species, and is an accompaniment of variation in organisms; whether the final result is good or evil, or a successful adaptation or not, or whether the force which compels the change is disease or not, or is simply a demand for a change of diet. It is true that not all organic difficulties of variation necessarily reach the consciousness as pain. But the need of a new adaptation has its characteristic difficulties, no matter what the organism may be, the change required, or the nature of the environment.

When a man begins to drink he sooner or later may drink to intoxication. After the debauch he reforms. But he may repeat the debauch in a few weeks or months. It does not require many parox-

ysms of drunkenness to establish inebriety, with its periodical craving. The drinking during this educational period is periodical. The nerve centres are educated to crave poison, to become debauched with alcohol, at periodical intervals, and then suffer disgust and remorse, and enter upon a period of sobriety. With alcohol it is all a matter of education or training.

Many medical gentlemen, who claim to be specialists in the treatment of inebriety, give heredity as one of the principal causes of inebriety. There could be no greater error. If inebriety were hereditary, all men would be drunkards. In fact, if the subject is studied from the basis of an intelligent knowledge of the laws of heredity in general, and the history of alcoholic indulgence among the highly civilized nations, the induction is clear that heredity tends to cure and prevent inebriety, as it does all other disease which is caused by a poison.

The very fact in pathology that inebriety is not a development but is a symptom of a condition of poisoning, that it is not like the resulting tolerance to poison which is a development, will show why inebriety is not hereditary.

The history of the civilized nations in relation to alcohol proves that, as in all other diseases, heredity tends to prevent and cure, by building up in the tissues of the body an immunity which is transmitted by heredity. It is true that this immunity can be overcome to a limited extent by the people ; but in the older nations, used to drink, the amount of

alcohol consumed and tolerated yearly would wipe out of existence a nation of equal population, which did not have the tolerance to, or immunity from, the poisonous effects of alcohol, acquired by alcoholic poisoning and transmitted by heredity.

The method of preventing any preventable disease is by creating a tolerance to the poison of the disease in the tissues. This is called immunity. It is true that this immunity is hereditary. If it were not the generations of men would have passed away before the data of human history, as known and written.

The history of every known disease caused by the poison of a germ tends to "cure itself," and all of them are "self limited." I am aware that these terms are scientifically incorrect, but they carry the correct idea to the mind. It is not a law of heredity that disease is transmitted. The law of heredity is that the immunity created in, and given to, or acquired by the tissues that are poisoned is transmitted by heredity.

But there is an obverse side to this question, as there is an obverse side to every other question, subject, or object. Turning it over we see that the obverse facts are as follows: As like produces like in heredity, a weak resistance to disease is hereditary, because, until there is an immunity to disease created, there is none to transmit. Heredity will transmit all the immunity there may be in any given individual, and will also transmit all the lack of immunity there may be at the same time. It follows

that the true meaning of the heredity of disease is that where there is a deficient tolerance to any given disease this deficiency is transmitted, and such people or other organisms having a feeble resistance to disease take the disease when exposed to it. The contagious or invasive power of the germ of disease is inversely proportionate to the amount of inherited or acquired resistance or tolerance the tissues may have to the disease.

People do not inherit disease. They inherit a weak resistance and "catch" the disease. Inebriety, in relation to heredity, reaches back no further than the cradle and the nursery. Children are made inebriates by alcohol, given to them as food or medicine. The same is true of opiates and of opium inebriety. It is a difficult matter indeed to prevent a disease and a habit which are thus so early formed.

The great reform cry of the temperance agitators should be to stop feeding babes alcohol and narcotics.

CHAPTER XVI.

INEBRIETY AND HEREDITY.

STATISTICS do not prove that inebriety is hereditary. It is true that inebriates may have parents or an ancestry with a nerve lesion, or even with inebriety; but this is no certain rule. Inebriates are derived almost equally from educated, ignorant, intemperate, temperate, highly moral and religious as well as vicious parents, and other ancestry. Inebriates are descended almost equally from an ancestry with nerve and other disease and those who apparently never had nervous diseases. Inebriety, however, has the reputation of being hereditary; I wish to investigate the matter from the standpoint of the laws of heredity and the transmission of diseases and other variations.

The law of heredity is that in reproduction like produces like, subject to variations.

This is a general law relating to individuals; but the law must be limited to many qualifications relating both to qualities and likeness transmitted, as well as to qualities of the variations transmitted. Like produces like, for instance, relating to species, orders, genera, etc., and like variations of certain kinds are transmitted. If a parent has a harelip,

cleft palate, or six fingers and toes, these variations may be transmitted. But if a man lose his right hand by accident, or a surgical operation relieves him of a cancer of the lip, causing an artificial hare-lip, these deformities will not be transmitted.

In the lower animals, as all men know, certain physiological qualities, as the fineness of wool, quality of milk, speed, color of the coat, disposition of mind, are cultivated and transmitted by heredity through selection.

These qualities are variations of type, which are physiological rather than traumatic. If cattle were dehorned for fifty generations, it is doubtful if this operation would ever produce a race of dehorned or hornless cattle. Cattle born without horns, from some physiological reason relating to use or disuse, will transmit the peculiarity. Nature, it appears, can be educated but not forced. By some unknown force, underlying or resulting from necessity, or use, or disuse, or from some accident or invention of development in embryology, a child may be born with two thumbs, and this peculiarity may be transmitted; but if the thumb of the right hand of every male of a family through fifty generations were amputated, it is not likely that it would result in producing a family with this hereditary peculiarity.

Certain tribes of Indians have piebald horses. They have carefully bred, by selection, this feature of horses. The Indians also put a brand on their horses, say the letter S. Every Indian knows that correct selection will breed piebald horses; but no

Indian expects that such a method will produce horses branded with the letter. If such a result were to follow the selected breeding and branding of horses for many generations, the Indian would probably destroy the colt and enter upon a series of religious sun dances, or some such prescription or superstition, to banish the charm.

The distinction between variations in type, then, which makes some of them transmissible and others not, seems to be that physiological variations are hereditary, but traumatic variations are not transmitted.

A tribe of American Indians have made a practice for many generations of flattening their babies' heads by fastening a piece of board or like substance over the forehead and vertex. The intelligence or superstition of the tribe recognizes some use for this procedure and result; but nature does not so see the deformity and refuses to transmit it.

Chinese ladies have for centuries cultivated a deformity of cramped and small feet. Nature partly acquiesces in this disfigurement by the force of marital selection and disuse. If people never use their feet, or walk but little, the anatomy and function will degenerate, whether or not the foot is cramped and pinched. But I have never yet heard of the birth of a child having its ears ready pierced for rings, although its female ancestors may have worn these ornaments for fifty generations.

The second law of variation, or quality of varia-

tion, which appears to be hereditary, is that a development of any trait or physiology due to the resistance to any injury will be transmitted. Resistance to injuries, or expenditure of energy by the physiology of bodily effort, creates variations that are hereditary. This is nature's conservatism. Nature creates these faculties and structures from use and necessity and transmits them. Nature will also transmit variations acquired by disuse, but not the deformities due to traumatism or injuries, without use or disuse. Nature publishes on the page of heredity the story of development and victory, due to activity or to inactivity in adaptation, but makes no record of entire defeat. If a limb is lost, nature makes no record. Nature will transmit the variation if the limbs are increased in muscular and bone development and nerve power by use. If the limbs are dwarfed in muscle, bone, and nerve energy, through disuse, nature will also transmit this condition.

Disease is proverbially hereditary. The chronic infectious diseases particularly enjoy that reputation. But investigating closely it will be seen that in the transmission of disease there are two methods of heredity. In the first place disease can be transmitted directly from the mother to the unborn child. In such cases the active disease is conveyed and not the results. I do not regard this as strictly within the jurisdiction of heredity, however; it is rather a method of contagion, or direct communication of disease. Consumption, syphilis, and no

doubt many other diseases are thus communicated. I do not doubt that inebriety may be transmitted, but in this manner only. I see no reason why alcohol, drank by the mother, should exempt her from making an inebriate of her unborn child.

Observation shows us that nature, in the heredity of disease, follows the same rules of conduct as in the acquirement and transmission of other deformities. Physiological variations acquired by the laws of use and disuse will be transmitted, but the traumatic lesions resulting from disease are not hereditary. Poisoning is traumatism or injury. If tissue is destroyed by a sharp edge, a crushing wheel, a hot iron, or a caustic or disintegrating poison, the result is the same in either case, being mechanical traumatism. This destruction of tissue is not hereditary. An induration, a degeneration, hypertrophy or atrophy are not hereditary, as such, except as acquirements of the individual to resist a cause of disease.

The results of poisoning are not hereditary. If a person have stricture of the esophagus from swallowing lye, the stricture will not be transmitted. If a person have the stamp of alcohol on his brain, due to the poisoning of that drug, and which results in a craving for drink, from the standpoint of consciousness this mark of alcohol, this inebriety, is not transmissible. Nature refuses to make a record of such a lesion, just as she refuses to transmit a cicatrix by heredity.

But in the heredity of disease something is

always transmitted. Alcohol may be directly transmitted, as I have said. The germ of disease can be an associate of reproduction as well as of life, and be transmitted in this manner; but this is not true of heredity. But from the laws already known I think it is an easy matter to learn what it is that is transmitted as the result of disease.

In this world of strife and development the phenomena of life are made up of action and reaction, or assault and resistance. I do not know of a phenomenon of physics or of life that is not created in this manner and that is not the resultant of forces acting in opposition. Animal and vegetable types and forms are determined and shaped under these laws. Living things resist each other mechanically and they resist each other's poisons. If the resistance is not sufficient they succumb; if it is sufficient they acquire an increased power of resistance. These qualities and forms are transmitted; nature creates them under the laws of use and disuse because she wants them; she transmits physiological variations.

But if in the struggle for life and a living an animal loses a wing, or a canine tooth, or its claws, nature does not transmit the deformity. Nature transmits the acquirement of resistance that grew out of the fight. If an animal is poisoned, it is either destroyed or it gains more or less immunity to the poison by a variation of poisoned tissues. No deformity resulting from the poison is transmitted, but the degree of acquirement of immunity, or

power of resisting the poison, is transmitted. In this manner nature enables those to live who can acquire the power of resistance. If every deformity caused by accident, or the result of the struggle for life, or disease, or poison, were subject to heredity, we would be a deformed race. The human skin would be a cicatrix, muscles would be threads and tumors. In short, humanity would be an indescribable monstrosity.

In heredity the resistance to disease is transmitted, but not the results of the disease. Nature does not adopt disease for its usefulness and make it a subject of heredity. In fighting diseases or other enemies nature gains information, wisdom, new types and new forms, through variation of structure under use or disuse; these things are transmitted by heredity.

Applying these rules to disease and to life we find there is what may be called an apparent heredity and a heredity which is real. It is the custom of physicians, when investigating a disease, diligently to trace the diseases of the ancestry of patients as far as possible. Life insurance companies do the same, rejecting applicants in good health on the diseases of their ancestry. Apparently there is here an incongruity, but in reality there is not. The acquirement of an immunity to disease is a matter of centuries of time and hundreds of generations. We know very well that certain families are tuberculous; others have other so-called family diseases and hereditary diseases. Now these dis-

eases are not hereditary in the light of true heredity. The diseases are not transmitted by true heredity, but they may be directly communicated. The explanation of a hereditary disease is that nature in that family has not yet acquired an immunity to that particular disease. If heredity handed down to succeeding generations actual disease and its results as a law, this earth would be as barren of life as the moon. True heredity does not transmit germs, poisons, scars, amputations, degenerations, or like causes or results of disease.

But heredity does transmit a feature of the results of disease. If disease leads to the disuse of a part or a function, this result may become a feature of heredity, if it is continued long enough to create an organic variation in type. But the rule of heredity is that pathology, as a direct entity, is not hereditary; its direct results are not hereditary; but the physiological resistance it creates, through physiological use, is transmitted, and any result of remote character may be transmitted which is produced by physiological disuse.

With these data in hand I will recapitulate the relations of inebriety to heredity.

Inebriety is a direct lesion of the tissue cells of the cerebro-spinal system caused by alcohol, and if it is alcoholic inebriety it can be caused by nothing else. This lesion is a pathological result, a traumatism, a wound. As such it is no more trsnamissible than a cicatrix or the stump of an amputation. But no such lesion or result of poisoning can

occur without creating resistance on the part of the poisoned tissues. The resistance results in an increased tolerance to the poison. That this is a law of poisoning cannot be disputed. This law is that if a poison is not fatal, one of its results is to create an increased tolerance on the part of the poisoned tissues to the action of the poison. It is known to all common observation that poison, taken in gradually increasing doses, creates a tolerance to its poisonous action. This tolerance is a power acquired physiologically by the law of use. It becomes, therefore, a bodily quality, just as much a quality of the body as the physiology of digestion. It is as much an organic part of the body as the teeth or stomach. It is not a cicatrix or a mark of nature's defeat. It is a hereditary quality and is transmissible. It is this law which underlies the whole phenomena of the acquired immunity from disease.

So far as true heredity is concerned its influence is entirely in opposition to the action of alcohol in creating inebriety. Observation will bear out this induction. It is true that many families are inebriates; but it is also true that many families whose ancestors were inebriates are now temperate or moderate drinkers. The result of the transmission of the power of resisting alcohol is to prevent, to this extent, the creation of inebriety as a result of drinking.

It is in this manner that nature teaches the tenets and pleasures of moderate drinking. It is

only by this method of nature that moderate or temperate drinking is made possible. If one thousand Europeans whose ancestors were drinkers for many centuries and one thousand native Americans whose ancestry never tasted liquor were given an equal quantity of liquor daily, the result would be one thousand native American inebriates and perhaps one hundred or less inebriate Europeans.

But beyond any question inebriety can be transmitted by the mother to the unborn babe, as other diseases may be by this direct method. No doubt children are born inebriates through this cause. Children are also made inebriates in the cradle and nursery. But heredity has nothing to do with these causes of inebriety nor with this method and manner of the communication of disease.

The most prominent instance of heredity, in relation to disuse, is found in the reproduction of the rudimentary organs, as they are called; notably the wolfian bodies, the appendix vermiformis, the pineal gland, and the nails and canine teeth. The wolfian bodies were kidneys in an ancestral worm. The appendix vermiformis was a greatly elongated intestine, acting as a pouch in a marsupial ancestor of the human race, which served to stow away for future use quantities of coarse fodder, as sticks, twigs, and grass. The pineal gland was an eye in the back of the head of a reptilian ancestor of man. The time came, in the course of animal development, when forethought was more in demand than "hind-sight;" hence the cerebrum underwent greater growth and

development; disuse, through the physiology of heredity, pulled the back eye into the head, covered it with the skull and the cerebral membranes, and buried it deeply beneath the cerebrum. In due time these memories of heredity will disappear from the human organization. There will be no terrible appendix, with its pathological fatalities, no pineal gland, or canine teeth, or wolfian bodies. The nails will probably remain, as they are again employed by usefulness, greatly modified from the original types. Nature is slowly getting rid of them all by the slow process of disuse and heredity. Surgery is doing much to relieve individuals of the appendix; but it is safe to say that this will not aid heredity. If from time to time until now the ancestral eye, or the pineal gland, had been extirpated by surgery from its original reptilian possessor and nature had continued to use the eye, or sustain a want for its use, people would be born to-day with a perfect eye at the back of the head.

All living things are subject to the conditions surrounding them. The human mind is subject to the same conditions. People are happy or in trouble according to corresponding conditions of life. It is impossible for two living things, or for two members of a species, or two persons in a family to live under and be subject to precisely the same conditions; for this reason no two living things or members of a family are precisely alike. No two people ever looked precisely alike and probably never will. Differences can always be seen some-

where when any two living plants or animals are inspected. But the law remains that like produces like, subject to variations, or subject to conditions of life, which cannot be precisely the same in any two living things.

Science has been busy for many years studying the hereditary feature of biology. The object is to find out the secret of reproduction and the substance or type of life which is the agent of reproduction, as a force, and the method of its action. The cells of tissues can be seen with the microscope. Their birth, life, and death have been watched and every item noted with photographic accuracy. Cells multiply themselves by division. One would think that this might explain the phenomena of heredity; but it does not to any extent further than to verify the law that like produces like.

In reproduction of animals and plants the combination of the germ cell and the egg cell reproduces the living organism after this general law of heredity; but the question to answer is, how is it possible that each of these two different cells contains all the characteristics of the organisms which they reproduce? Each cell contains in some form a complete record of the whole anatomy of the parent, and not only that, but family variations, and the structure, peculiarities, and vagaries of its whole line of ancestry. If a germ cell or an egg cell could be opened and read, it would reveal the history of its ancestry back to the beginning of life. It is all there. The birth of each new order, species, and

family is written on the walls of that cell. Nothing seems to be forgotten. As life is developed and the form of the living organism develops, the whole anatomy of the parent is reproduced, with certain characteristics of family, race, and species; even the mementoes of more ancient and less developed ancestry are reproduced.

In the union and blending of the two cells, the germ and the egg cell, the characteristics of both parents and families are there represented. It is here where the great struggle for the survival of the fittest begins. The result of this blending is that the strongest characteristics survive, but they are modified by the weaker and opposing ones. No end of philosophy and science yet unwritten and unread will date from the reproduction of life, and the physiology of these two cells, in relation to heredity.

Scientists and philosophers, who have graduated from the schools of thought, have stood at the portal of nature's temple containing this mystery of life, and, knowing little, have ventured to suggest hypotheses. The human way of explaining laws which are uniform in character is to suggest a more general law that is in uniformity with these more special laws. A few men have suggested hypotheses to explain why it is and how it is that two cells of different kinds, representing the complete existing and historical record of two living organisms, back to the origin of life, can be so constructed and so endowed. It seems incomprehensible; it seems impossible; but we know it is true.

History tells us that a certain astronomer could not mathematically explain the solar system without hypothecating the existence of an unknown planet. The astronomer's figures led to the discovery of the supposed world. Philosophy is now attempting to read the written history of the reproductive cells by the same method. Reasoning is sometimes in advance of the glass lenses of the telescope and microscope.

Herbert Spencer, Charles Darwin, De Vries, Haeckel, and Weissman have ventured hypotheses to make the explanation of the problem of heredity in reproduction. Practically there is little difference in the suggestions of these scientists. They all assume the existence of minute organisms which inhabit the germ cells, about as delegates inhabit a convention or as written books occupy a library.

Herbert Spencer called these imaginary creations physiological units. Darwin spoke of them as gemmules. These men associated the idea with living organic individuals, as delegates to a convention may be understood to represent the character and sentiment and structure of their respective communities. De Vries, Weissman, and perhaps others name the substance which is thus the representative of heredity in the germ cells, germ plasm, or pangenes ; giving an idea which is more like that of written records collected in a safe deposit or a library.

This hypothesis is no doubt approximately correct, considered from the stand-point of the general

idea. We know that nature maintains a record of all history. There is a geological record, a zoölogical record, and a record of plants. The record made by nature tells how worlds are made, inhabited, and go out of existence. A living record is represented by every organism. The idea of units, representative of the complete anatomy of an individual, as a delegate from every cell in his body, and representative also of every phenomenon, occurrence, act, and formation of his history, with that of his ancestry, and numerous enough to represent all these things, existing in a reproductive cell, is not inconsistent with what we already know about the magnitude, great and small, of living things.

We have reason to believe, also, that nature in some manner makes a record of her own acts on protoplasmic organic structure and cell organic structure. The nerve impressions made upon certain nerve centres, which we know as memory, must be a record of this character. It is of little consequence whether the representative units have written records, or whether their force in heredity comes through a function similar to tradition. It is certain that by some physiological process the reproductive cells contain the record of heredity.

But the great complexity of function of these representative units can scarcely be imagined. As representatives and delegates from every historical item and every tissue cell of the parents, they are to create and determine the character of a new living organism. The struggle is to

prove the species, to build up a variation or two from the original type, which shall be an improvement.

But whatever the struggle and result may be, it would seem that a formulated code of heredity has been established. A regular method of practice has been adopted. Certain things in reproduction are generally rejected on appearance. In addition to this there is a developing force in the ascendant in heredity, which generally obtains the strongest representation. Generally the world grows better through heredity, subject to the conditions of life.

By the established code of conduct in heredity mutilations which are not the result of physiological manufacture are not reproduced. Scars and the pathological results of poisons are not reproduced. Inebriety is not reproduced. It is rejected by the code of hereditary transmission along with the surgical deformities and the results of mechanical violence.

Inebriety is made up of certain distinct factors of anatomical changes and symptoms of representative character. The cells are poisoned, and, as a consequence, undergo variation. This variation is complex and of unlike factors, because one of the symptoms is a craving for drink, another is a periodical disgust for liquor, and still another is an increased tolerance to the drug.

It appears that this increased tolerance to the drug is the only factor transmitted. The direct effect of the poison is to cause a traumatism; this

change of conditions creates the appetite for liquor. The cells acquire, by physiological action, a distinct variation which enables them to resist the poison, or tolerate a greater quantity of it, which is comparative immunity; this quality, being the product of physiology, is transmitted. In ptomaine poisoning of certain kinds great pain in a peripheral nerve may follow, being named neuralgia. If the disease proceeds, neuritis may succeed, and even nerve degeneration. But another result is also an increased power of resistance to the ptomaine. In this case the neuritis, or the degeneration, will not be transmitted; but a per centum of the acquired immunity will be inherited or transmitted. A certain degree of moral weakness goes with drinking and inebriety. The moral weakness leads to drink, or permits it. Ethics is the result of mental development, and, as such, is a physiological acquirement. As a result of a weak ethical heredity a person drinks and goes on to inebriety. But in such a case the inebriety is not inherited. Nature endeavors, through heredity, in such a case, to balance the hereditary weak moral character by an increase of the tolerance to alcohol. The weak ethical condition is transmitted.

Many vicious immoral men are temperate drinkers, if they do not entirely abstain. They may be occasional or temperate drinkers, but are not known as drunkards, although they may belong to almost any of the classes of criminals.

On the other hand, men of the highest intellect-

ual and moral character may be inebriates, although inebriety is unknown among their ancestry.

For these reasons I do not regard inebriety as hereditary. It is a disease that is acquired at some time during life by every individual who suffers from its terrible grasp. But it is most certainly a curable disease.

CHAPTER XVII.

CHILD INEBRIETY.

INEBRIETY has been considered as existing only among men and among women. Young men and young women, we find, suffer from inebriety just the same as the older ones. This fact may not be new, but it may be a new way of putting it. Drunkenness begins at all ages. If it is desired to "wipe out" this great curse, one must go to the cradles and the nurseries to do it.

No thought can be more startling to the brain and heart of a thinking, feeling woman or man than is the fact that babes are made inebriates in the cradle and nursery. That the innocents should have inebriety forced upon them brings a shudder of pity. Here in the nursery and in the cradle the child is in its mother's hands — in her very arms. How can a child under such circumstances be made an inebriate? Babes are made inebriates, of course, by mistake. No mother would voluntarily do anything that would poison her babe or cause it to grow up a drunkard or a drug-user. Alcohol is the same liquor on the nursery table or sideboard as it is in the saloon. It has the same effect when given to a babe as when taken by an older person.

If it is "good" for any purpose in one place, it is in the other. If a physician prescribes it, a friend "treats" it, a man takes it himself, or if it is drank as a compliment, or a fashion, medicine, luxury, or as a habit, one dire result is the same in all cases. The result is that inebriety is produced proportionately to the amount of liquor drank. Other inebrieties are the penalties of babyhood, the nursery, and thoughtlessness. The soothing syrups contain opium — all of them. Soothing syrup given to "quiet" babes poisons them with opium and causes opium inebriety. Mothers and nurses know how difficult it is to wean a babe from a favorite soothing syrup which has been used habitually for some time to keep the child from crying, or even to treat disease. The reason is that the child is an opium inebriate and is enduring the pangs and torture imposed by this poison and by inebriety. Every one knows that the use of soothing syrups and liquors is almost universal in childhood. When a child is born, alcohol, in some form, is generally there. It is rare that a child escapes liquor in its first bath, or its first twenty-four hours without a few drops of "sling." Very likely within a week it gets a dose of syrup or other preparation of opium. The agent of inebriety continues along with the development of the child. Little nursery ailments are treated by these domestic remedies, and where these fail, as I shall show, the physician prescribes the same cure. When the diseases of childhood come on, the same remedies are used. In fact, the principal treatment for diphthe-

ria is alcohol ; children are sometimes given, under direction of physicians, a teaspoonful or more of whisky every two hours for this disease.

The other diseases of childhood, measles, scarlet fever, whooping cough, etc., are treated in a similar manner. It is rare indeed that a child succeeds in getting through even its teething period without the penalty of alcoholic inebriety, and it is fortunate, indeed, if it is not both an alcoholic and an opium inebriate.

Much has been said about the heredity of inebriety. There is no evidence that this disease is hereditary. If it be possible that its heredity reaches back any farther than the cradle and the nursery, then it certainly can reach no farther than the influence that alcohol may have on an unborn child, if liquor is drank by the mother. I do not doubt that inebriates are born and made in this manner. Mothers may sometimes be inebriates, or take liquor as a remedy. The danger is to the child. The alcohol, no doubt, circulates through the brain of the infant unborn, under such circumstances, and puts the stamp of inebriety on the delicate tissues. When the child is born its first crying breath is likely to inhale the odors of liquor. It enters the cradle and its cry is stifled by opium and whisky. It has the diseases of childhood and these drugs are used as remedies. It then goes into the world cautioned to "Touch not, taste not, handle not;" possibly it may not; but this child is already an inebriate, unknown to itself, and its first drink may lead

into a prolonged and heart-breaking debauch. He enters upon the career of a drunkard, and unless cured will torture existence for a few years with an inebriate's misery of life, and then fill a drunkard's grave.

All men and women—fathers, mothers, brothers, and sisters—should know one great truth relating to the different drug inebrieties. This great truth is that each inebriety, alcoholic, opiate, or whatever it may be, can be caused by nothing else than the corresponding drug. No art, accident, anathema, disease, or calamity, or heredity can cause drunkenness or alcoholic inebriety.

But now look on the obverse side of this question. It reads that alcohol will always cause inebriety. This is true. One drop, or any other quantity of alcohol, continuously given will cause a proportionate inebriety. Alcohol at any time of life will cause inebriety. Whether drank in the cradle, or nursery, or saloon, or hospital, or harvest field, or in fashionable society, or at the convivial board, the inevitable, relentless consequence of liquor taking or giving as medicine or luxury is always inebriety, as a disease, in a definite ratio to the amount of alcohol drank. It is for this reason and under this law that babes are born inebriates and their disease is nurtured and fed in the cradle and nursery. It is by this law of poisoning that the few who escape inebriety in childhood may be made inebriates later on in life, through the influence of good society, or bad society, or sickness, or vicious-

ness. The quantity of liquor consumed by Christian nations is simply enormous; but they do not drink it without results, for the amount of inebriety and its accompanying sorrow is also of equally "magnificent proportions." There is no alcohol without inebriety, and no inebriety without alcohol. Whether estimated from the standpoint of individuals, whether babes, or men and women, the measure of alcohol drank is the measure of the disease of inebriety. Abstinence from alcohol, or "temperance," rests largely with the women of all countries. The women suffer with inebriate husbands, while the husbands are sober enough to know the meaning of misery; but the woman's sorrow continues while the inebriate is sleeping off the coma of debauch under her care. When the husband enters upon his paroxysm of inebriety he throws a pall over the household. If poverty is the result, the women and children feel the burden. If the inebriate is brutalized by liquor, the wife is the subject of his brutality. If the wife is degraded, her loss of pride in home and love of husband is the cause; and liquor is behind them all.

I, therefore, need only offer this hint on child inebriety to give intemperance and the dragon alcohol a severe blow. The method of causing inebriety in childhood is the secret of intemperance. It is to intemperance what the riddle was to the dragon slain by Jason when he recovered the golden fleece. In the future I may some day see a painting—one of the grandest on earth. It will not be by one of the

old masters, for the old masters knew not the subject, but the picture will be by a modern artist. It will picture an infant in its cradle smiling with baby happiness because its mother is near. The mother is standing by, one hand resting on the cradle; with the other she is pushing aside the tempter, alcohol. She will not have alcohol, either as remedy, food, or luxury for her child. She does not need to be clothed in tragic dress, or grasp the monster, intemperance, by the throat and strangle him for centuries of deception and degradation. She stands where she is queen, in her own nursery, by her own child, and she simply says, "I know better than to poison my child with inebriating drugs. I will protect him; he shall not suffer; he shall not be poisoned; he must have the privilege of a sober life."

This will be a picture from real life. It will represent the true reformer occupied at her work. True reform consists rather in preventing evil. The mother by the cradle of her child preventing the taint of pure blood by alcohol is the key to the position; following this, alcohol must abdicate as a medicine and limit its jurisdiction to fashion, vice, and luxury.

Many people like an excuse for failings. Some people will apologize, even, for disease. The conviction is growing upon the public mind very rapidly that the public is responsible for disease, and men and women are entirely responsible for the vice of drinking. I do not say that every man who is an inebriate is responsible for his own inebriety, but I

say that the public is responsible for all disease, including inebriety. The so-called preventable diseases should be prevented. The vice of drinking in private or public and the mistake of giving babes the drugs that bind the innocent brains and hearts in the degradation of such slavery are responsible for all this inebriety and disease and for the misery of drunkenness.

It has been remarked by some good and mistaken people that the present generation cannot be reformed; that the disease with them all is hereditary, and the attention of reformers must be directed toward the succeeding generation. This is a mistake. In the first place any inebriate can be cured. In the second place the laws of heredity, as understood from the general laws of biology and the special laws of poisoning, do not prove that inebriety is hereditary. In fact they prove quite the contrary. People either do not observe correctly the succession of events in heredity or they do not sufficiently understand the laws of inheritance.

We know now, very well, just what things are inherited and what are not, and a little observation of facts will show us that nature does not transmit a craving for drink, but transmits, rather, an increased power of resisting the poisoning effects of alcohol. If this were not true, and if hereditary inebriety were true, this world would have been depopulated within five hundred years from the date on which Noah planted his vine. We forget, or some of us do, that there is an optimistic side of nature. Some-

thing has not only kept up the total population, but has also lessened the power of epidemics and developed civilization.

That alcohol is a universal and general prescription for children's diseases needs no proof. There is not a book published on this subject which does not furnish the evidence in so many words. The medical works of Drs. Flint, Tanner, Pepper, Zeimssen, Henoch, Smith, Aitken, and others, all agree in the use of alcoholic liquors and opium in children's diseases. I do not dispute the value of these drugs as a medicine in any case or disease as obtained in their medical works. On the other hand I do not doubt that a satisfactory substitute can be found in each case for the alcohol. But there can be no denial that alcohol, given under these circumstances to children, creates the disease of inebriety.

The banishment from Eden did not destroy the sacredness of home. This is the place where children are cradled, educated, and developed; where the human beatitudes of love, virtue, and happiness are like the stars of the night and the shining suns. But the trail of the serpent can be seen over the domestic flowers inherited from the ancestral home. The old tempter was in the form of a serpent, but the trail made over the cradle, the toys, the luxuries of the modern home is by the worm of the still.

The skill of evil lies in the mistakes of ignorance. It requires technical knowledge to know that alcohol cannot be given to babes without caus-

ing inebriety; but now this greatest of mistakes will be remedied, and this most wretched evil will disappear. Mothers will not give their children alcohol, and medical science must find a substitute for liquors as a medicine.

Any drug which causes a corresponding inebriety may cause other diseases in addition to the inebriety. Nerve degeneration, fatty organic disease of various organs, amyloid degeneration, and other types of organic decay may be among the remote results of alcohol.

But these conditions have nothing to do with the inebriety proper. Curing them will not cure the inebriety. The meaning of inebriety is that it is a lesion of the tissue cells, caused by poison, which produces one great symptom—a craving for the drug in question.

Inebriety caused by whisky is a craving for whisky. The craving is there constantly or periodically, whether the liquor is drank or not. The terms drunkenness and inebriety are frequently confused. A man who has chronic poisoning from alcohol is an inebriate, because he craves liquor. Drunkenness is acute alcoholic poisoning from drinking alcoholic liquors, in consequence of a craving for them, or inebriety.

Heredity has always ranked high as a cause of inebriety. I think that as a cause it ranks among the least. I do not think the craving for drink is transmitted by heredity. I do not think that any other nervous disease ever creates a craving for drink.

I do not think that any condition of life, mental, moral, or physical, ever creates a craving for drink. These things may all lead a person who is not an inebriate to begin drinking and make an inebriate of himself, but they do not cause inebriety in any other way.

In my opinion—and I base it on an induction from facts that no one can dispute, and that are known to all people—the heredity of drinking reaches back no farther than the cradle or the unborn child. The two great institutions which lead to the disease of inebriety are the saloon and the nursery. The two great conditions of life which lead to drinking and drug taking are illness and custom.

The diseases of infancy and childhood create the call for and the use of the drugs that inebriate. Indigestion, too much crying, cholera infantum, measles, scarlet fever, and, particularly, diphtheria are treated by alcohol and opium very largely by the physicians. Children with indigestion are fretful and are quieted by whisky or brandy, or some preparation of opium. It is impossible to give children opiates or alcohol in any quantity without causing a corresponding drug inebriety. All people who have had experience as nurses, or who have closely observed the troubles of childhood and their antidotes, will bear me out in these observations. The drugs are used in the manner I here state. The consequences cannot be denied. If the drugs are used in this manner, then it is true that they make

inebriates of children or it is not true that these drugs cause inebriety in any person, under any conditions.

The stamp of the drug remains on the brain of the infant, even if the drug is no longer given. The misery of babes, drugged to inebriety and then, very likely, suddenly deprived of the accustomed stimulant, is without doubt as acute and great as in older people. But even if the drug is no longer given the inebriety remains. When the babe grows up to the stage of youth he has the craving without a name or understanding, perhaps, until for some reason a stimulant or dose of the accustomed drug is taken. There is then an immediate, and, perhaps, prolonged debauch, followed by the usual phenomena of inebriety. It makes no difference if the drug is alcohol, or opium, or both. Both of these inebrieties may exist in the same person, and he may be both a drunkard and an opium user; this condition can be and is the result of opium and whisky inebriety acquired in the cradle and nursery.

The inebriety of youth, of middle age, and of the whole life is often the result of child drugging rather than heredity. In fact, observation will prove that in those cases of apparent heredity the parents and children were each drugged with opiates and alcohol. In all estimates of the relation of heredity to inebriety this factor must be considered, and it must be clear that in order to rectify the heredity of inebriety it must be proved that the children of

inebriates have not had inebriety thrust upon them by giving them the drugs that cause this disease while they were yet inhabitants of the cradle and nursery.

Child inebriety is one of the most prevalent diseases. It is coextensive with alcohol and opiates given to children for any cause whatever. It is therefore as extensive as the prevalence of the diseases of childhood, because the inebriating drugs are universally used in these diseases.

I regard child inebriety as the chief cause of intemperance among all classes. I do not say that every child subjected to the influence of these drugs becomes an active inebriate; but I say that if the history of inebriety is carefully inquired into, it will be found that the larger number of inebriates took opiates or alcohol when they were children.

The question has prominent moral and medical factors for consideration. Is it a medical necessity and is it morally right to give children the drugs that enslave as remedies for diseases? I claim that in the present stage of the development of the science of inebriety and its treatment that necessary remedies in diseases must be used. If statistics verify that only ten per cent of diphtheria cases recover without alcohol while thirty per cent recover under its use as a remedy, then the remedy must be given. However, the new remedy, antitoxin, we trust, will obviate the necessity of alcoholizing the infant system throughout the future in this disease. The same rule must govern the use of other drugs.

The question of preventing these diseases grows more important the more it is considered. The infant mortality from children's diseases has always been the great and important theme of the sanitarian. It is better to prevent the children's diseases than permit the great mortality and the inebriety resulting from their non-prevention. The prevention consists in general and special sanitation. It is my firm conviction, and all things appear to verify it, that, viewed from whatever standpoint, the intemperance of this world is caused by the lack of sanitation which can destroy the preventable diseases.

In the great majority of cases inebriety is directly caused in childhood, as well as in adult life, by drugs used as remedies. The prescription, the cradle, the nursery, as well as the invitation, the saloon, and social customs are responsible for the widely diffused disease of inebriety throughout civilization.

CHAPTER XVIII.

ACUTE ALCOHOLIC POISONING AND DELIRIUM TREMENS.

WHEN any form of alcohol is drank it does not undergo digestion or other changes of a chemical nature in the stomach. Instead, it immediately enters the blood current through the veins of the stomach. A few years ago, and before the modern use of antiseptics, alcohol was freely applied to wounds. In such practice it was learned that the drug was taken into the circulation by the blood vessels of the wound, in quantities sufficient, even, to cause symptoms of poisoning or drunkenness. It is also known that alcohol may be absorbed through the unbroken skin, and that alcohol baths, lotions, and baths in eau de cologne will cause intoxication by absorption. The fact is that this habit of using alcohol or cologne baths is a mild type of inebriety, which is quite common. Napoleon was credited with taking a daily sponge bath with the perfumery named.

But when alcohol gains a place in the blood current it circulates in greater proportion in the brain and liver. These organs have least resistance to the presence and poisoning action of alcohol. For this reason alcohol is said to have an affinity for the

liver and nerve centres. There is no "affinity" in any relation between it and the bodily organs; it is only a question of the degree of resistance which the different organs of the body may possess. Alcohol accumulates in the greatest quantities where it meets with the least resistance.

One of the stirring questions relating to alcoholism and alcohol, which has been the subject of much controversy, is what becomes of the alcohol after its entrance into the blood current? Observation tells us that the system gets rid of it by some means; for intoxication, not its results, passes away in a few hours. It is clear that the drug is either eliminated from the body or destroyed.

Numerous experiments have been made to settle this question, which may be considered at the present time to be fully determined. The fact appears to be that a small fraction is eliminated by skin, lungs, and kidneys, but the greater part is consumed or oxidized in the blood and tissues.

The first series of experiments were made by the chemists Lallemand, Perier, and Duroy. These were followed by those of Parker and Wallowiez. These experimenters sought to verify that alcohol was eliminated by the skin, kidneys, and lungs; this they proved to be true; but their experiments did not prove that the whole amount taken was thus eliminated. They made a qualitative but not a quantitative test.

To obtain further data on this question animals were fed with alcohol to excess and then killed,

when the alcohol was sought for in the tissues, with the result of discovering only small quantities in proportion to the amount given.

The proof is clear that when alcohol is taken it is not eliminated by the emunctory organs, but that it undergoes a chemical change in the blood and tissues of the body. Some experimenters contend that the products of this chemical change are carbonic dioxide and water; while others say that the products are aldehyde, and oxalic and acetic acids. The practical question is that when alcohol is thus consumed it yields force, which is utilized by the tissues. There is very little denial of the general observation that the use of alcohol conserves the physiological forces and that it lessens the bodily waste. The fact is confirmed by chemical tests, which show that the elimination of urea is lessened under the influence of alcohol. It is well known that the moderate use of alcohol increases the bodily weight and inclines to corpulence. These facts, together with the well known one that alcohol lessens the temperature of the body, go to prove that the drug has force that takes the place of food, directly, and that this action is aided by indirect action in lessening the waste of the body.

The physiological action of alcohol, or alcohol as a poison, varies as the dose. In fact a close study of the subject shows that a large dose has an opposite effect all round to the effect of a small one. This is the law of all poisons and of all drugs used as medicines.

In a small dose alcohol is, however, not a poison. It is a stimulant. By this is meant that when a dose of alcohol is taken it increases the activities of the tissue cells and bodily organs. This increased activity is for the purpose of getting rid of the alcohol. But an increase of the activity of the organs and tissue cells cannot occur, with a single exception, in any other direction than their normal functions. The normal functions of the cells are nutrition, reproduction, and special function. The cells absorb nutriment, they reproduce other cells, and they produce special work. Thus the liver cells, as a special function, manufacture bile; the kidneys, glands, nerves, and other special organs have special types of cells, with corresponding special functions.

A small quantity of alcohol, half an ounce, say, in form of liquor, or diluted in water, acts as a stimulant. It increases the activities of cell metabolism, or cell work. This increases, or means the increase of, cell nutrition, reproduction, and special function. A small dose, therefore, increases the activity of every organ of the body. It brightens thought and feeling. It sharpens the special senses. It increases the digestive fluids, the action of the heart, kidneys, lungs, and other organs. It increases all functional activities, and it raises the temperature. But it does one thing more with the tissue cells — it causes them to undergo a variation of type; this variation is designed to enable them to acquire a tolerance to the poisonous action of alcohol, to resist it the better.

It is this action of alcohol that gives it whatever medical power it may have. It must be remembered, however, that when given in a disease, or to antagonize the poison of a disease or the shock of an injury, a larger dose is required to produce the usual stimulating effect. Too large a dose, though, will do injury by favoring, or acting in the same manner as, the poison of the disease. In shock from injury too much alcohol will aid the paralysis of the heart.

If four to six ounces are taken the effect is opposite to that of a stimulant dose. The intellectual part of the brain is paralyzed. The victim is comatose. He loses consciousness, will, memory, and volition. His muscles are paralyzed. He loses sensation, both special and general. His temperature falls about two degrees. The special functions of special organs cease action, more or less completely. There is no digestion and no secretion or excretion; this condition continues until the victim either dies, or the alcohol is disposed of by the physiological forces.

This is acute poisoning or drunkenness, or a fit of debauchery. The poisoning is caused by the action of the alcohol upon the tissue cells. By this action the functions of the cells are greatly lessened. Their nutrition, reproduction, and special functions are temporarily abolished. They appear to have but one power left—and those powers which are not destroyed acquire an increased strength to resist the poisonous action of alcohol.

They also are forced to assume that condition, which, in order to get rid of, entails a very painful atavistic variation. In other words they are so changed in type that alcohol becomes necessary to them; they crave alcohol—and this is inebriety.

When the person awakes from the coma of acute alcohol poisoning the drug is disposed of by his body forces. All functions seem at a stand-still. The nerve centres and every tissue cell crave alcohol. The mind is confused and bewildered. The sensory nerves are exalted, consciousness is pricked with pains, the muscles are tremulous, the secretions and excretions locked, the circulation feeble, the temperature low; there is general physical and mental agony. The principal powers of the body seem to be a craving for liquor and an increased tolerance to its poisonous action. The victim will require nearly as much liquor to remove his pains, steady his nerves and muscles, and start the general and special functions of his body into action as he drank the day before to bring about total oblivion. When the liquor is drank the bodily functions are restored, but under a new dispensation. The cell activities and the functions of all special organs are now under the dominion of alcohol. The cells have undergone a variation, giving them a greater tolerance to alcohol; the atavistic variation, which must follow if alcohol is withdrawn, is painful in its nature, because alcohol is an anæsthetic; this pain, because relieved by alcohol, is interpreted as a craving for liquor. This is inebriety.

In a debauch an inebriate generally drinks to unconsciousness. The reason of this is that a forced variation of cells is always painful. During a debauch the cells are as active as possible, but with increasing loss of function. The organs, tissues, and cells are fighting alcohol. It is a war, and "war is cruelty"; a battle is painful. The inebriate swallows drink after drink, because each additional dose lessens his consciousness of the distress of this warfare. He drinks until anæsthetised, until the pain ceases, until the resistance of his organs is stilled, until his consciousness fades into oblivion and he sinks into the sleep of coma. In a debauch the inebriate does not continue his doses for the reason that his pleasure is increased directly, but because the pain of poisoning is lessened thereby. But many people do not drink to this excess. There are reasons for this. These people have by inheritance a greater tolerance to alcohol. Poisoning by alcohol does not cause them so much general distress. The higher cerebral centres, as well as the centres of the sympathetic system, have a greater tolerance to the poison. These people are more moderate drinkers simply because they, by reason of this tolerance, do not feel the pains or have the craving for liquor. They are said to have greater will power. This is true, but the nervous substratum of their will power has a greater tolerance to alcohol. The inebriate's debauch lasts from three days to as many weeks. During this period, in a typical inebriate who inherits a weak resistance to alcohol,

each day sees a greater quantity of liquor drank and each night there is the same coma. The debauch continues until some organ succumbs to the poison; sometimes the brain, sometimes the stomach. When this occurs there is a general consent of all organs and tissues to go through the terrors of a change backward to old conditions. There is now a disgust for liquor, but with this disgust there is remorse of conscience, mental inebriety, or insanity, delusions, illusions, and hallucinations of greater or less degree and extent. There is paralysis of nerve centres and of special functions. Appetite and digestion are lost and excretion is at its lowest ebb. Pains are innumerable and severe. The muscles are tremulous and incoördinate. The suffering of mind and body is intense. This is delirium tremens. The disease varies only in degree and not in character in different cases, and its average duration is five days if not cut short from any cause.

This condition represents the atavism of the variation of the cells. They are losing during this period their acquired tolerance to alcohol and assuming the type they held before the debauch. When this condition is reached the delirium subsides, the excretions are increased, the appetite and digestion return, the natural mental condition is restored, a period of sobriety follows, and all is well except a feeling of remorse and shame in all inebriates in whom these feelings are not destroyed or who were ever gifted with such feelings.

The objective symptoms of drunkenness and delirium tremens are familiar to all physicians, as well as other observers. The primary effect of liquor upon the mind, as the inebriate enters upon his debauch, is to exalt his mental and emotional activities. He loses his control of speech and wears his secrets on his sleeve. He is usually very amiable and his self-confidence is wonderfully increased. He has no cares and all trouble and difficulties become little pigmies of the imagination. He has great faith in himself. He expresses his opinions loudly, is always ready for an argument, and is very impatient when contradicted. The cerebral centre which controls actions and speech and gives the cautious and prudent self-control of ideas and conduct is paralyzed early; the hidden, self-contained Ego suddenly stands out fully exposed and a "clean breast" is made of the man's inner life. Words roll off his tongue in a ceaseless torrent — words that his restraint has buried and hidden from sight, but which now come forth as spirits and goblins from hidden caves, laden with calamities and foolishness. All the passions press to the front without concealment or restraint and with increased intensity and activity — love, fear, hatred, and anger lend their changing colors to impulses that are uncontrolled.

The inebriate, in thus poisoning one nerve centre after another while he continues to drink, tells the story of man's development as well as dishonor. Whatever was created last in human development is

lost first as the inebriate continues to drink. The higher centres, the cerebrum and mental faculties, are the first to go. Of these faculties the very first to fail is mental restraint, or the inhibition of the expression of ideas, conduct, and physical action. The motor forces are yet stimulated, and for this reason the inebriate talks without restraint. The psycho-motor centres are yet active and the inebriate travels rapidly about, very often calling upon friends, visiting his enemies, and entering business places where he exposes his condition—conscious of everything he has ever heard or known except that he is drunk. His modesty is gone. He fears nobody. He meets people with whom he is not on good terms and proceeds to argue their differences, perhaps grows belligerent and gets into a brawl. This condition seems to teach that in human development the faculty of moral restraint was among the later creations.

The rule is that the inebriate, as he continues his debauch, has little consciousness of his condition, or conduct, or mental and bodily activities. He appears semi-conscious, but after waking from his coma he remembers nothing of what has occurred. But as the debauch continues the lower brain centres become involved, muscular action becomes incoördinate. The man reels and staggers; he is losing conscious volition. For a time yet his motor activities are sustained, and he walks about in a drunken, talking, brawling, staggering, and drinking state. But now the automatism of the nerve centres of organic life begin to act. The will has

no activity or control of his actions. He seems to be guided by other forces than mind and will. The organic centres take up the thread of life and conduct, and, if possible, get the drunken man home. Practically, he is now a somnambulist. He reels homeward, even takes the car, or drives his horse — or does these things as well as the automatic nerve centres and spinal cord can do them, as educated by habit. Men in this condition will unconsciously find their way home, along the accustomed routes by the accustomed methods, and the next day remember nothing about it.

But if the inebriate indulges in a debauch away from home or familiar place, the same attempt of his automatic life leads him into trouble. He wanders off through the streets unconsciously searching for home, and, unless taken care of, finally goes to bed in the gutter, or walks into the river or off a bridge, or into other danger. As a rule the inebriate always drinks in his debauch until he reaches this condition.

But the unconscious action of inebriates is sometimes surprising, and illustrates how great is the force of automatic life. Surgical operations, mechanical work of other kinds, and many other examples of work and activities have been performed by men who afterwards slept the sleep of alcoholic coma, and when they awakened knew nothing of what they had done. Sometimes this automatic work was done fairly well. It was all work, however, that the person was in the habit of doing; the cen-

tres of automatic life performed the work again with certainly very little help from conscious volition. Thousands of people are killed every year by the direct poisonous action of alcohol. Thousands more are killed indirectly by reason of the unconscious walking into danger by the inebriates. The wonder is that every inebriate does not poison himself to death in the period of the debauch. The only reason, if other things are equal, is simply because the lower brain centres can resist more poison than the higher. If the nerve centres which control the activity of the heart and lungs had as little resistance to the poison as do those of the will, memory, consciousness, and intellect, the first debauch would probably be the last. But when the stage of drunkenness is reached which destroys the mental faculties the drinking stops. If the inebriate has continued his drinking, as is usual, or a small glass at a drink, for several hours, there may not be alcohol enough in his blood and brain to destroy the centres of organic life, and after a few hours of cerebral paralysis and mental oblivion consciousness and the mental faculties are liberated.

In a debauch with fatal ending, as the inebriate or drinker proceeds, the nerve substratum of that truly great faculty, mental and physical restraint, is the first to fail. Consciousness, intellect, volition, and memory go next. If sufficient alcohol is taken, the nerve centres of the respiration and the heart fail and the coma of alcohol yields to the eternal sleep of death.

CHAPTER XIX.

INSANITY FROM ALCOHOL.

THE most pitiful and hopeless type of insanity is called general paralysis. The brain, spinal cord, sensory and motor nerves, and the muscles gradually and successively become involved in a progressive disease and cease their functions. The mind first exhibits excitement and over-activity; then grand delusions, maniacal raving, and, finally, it sinks away into imbecility, idiocy, and coma, always followed by death.

The disease is incurable; it has but one ending. Its special cause is not yet verified or known, but the pathological results show degeneration or decay of brain and nerves.

The disease attacks alike the bad and the good, the wise and ignorant, the rich and poor, of either sex. Neither overwork, nor leisure, nor idleness causes it, or prevents it, or predisposes to its ravages. It has a specific cause, no doubt some species of microbe and its poison, which no method of life, or type of life, or style of living can induce or prevent.

Cases of this type of insanity are common enough and within the observation of every commu-

nity. Many celebrated and widely known persons have been attacked by the disease. I will note its special characteristics more definitely, as I wish to compare it, or its symptoms, with the insanity caused by alcohol.

The first symptoms of a mental character are generally those of depression. The sick person appears to be melancholy. Then he begins to lose his sense of the proprieties of life. He is rude in conduct, inclined to be quarrelsome, and loses his personal restraint. He has no secrets and respects none. His memory fails. His will is weak. Then his mental disorder is shown in his business acts. He makes bad bargains, spends money lavishly, buys all he sees and does not need, or whether he has need or not. He is particularly abusive to his family; if exhibiting some power of self-control away from home and among business associates, when he reaches his home he throws self-control away and vents his harbored spite upon his terrified wife and children.

Following this stage come delusions of grandeur. Those having a religious turn of mind become saints and even Saviours; those politically inclined are emperors, kings, presidents, and senators. These wretched victims roll in imaginary wealth and entertain schemes to buy continents, subsidize states, and incorporate the moneyed wealth of the world.

Then the patient may exhibit symptoms of mania. He becomes violent, and, ceasing to argue or direct, essays physical force to secure his desires

or repel opposition. He is then arrested and imprisoned in an asylum.

But sooner or later the signs of paralysis appear. The speech becomes difficult and thickened, owing to paralysis of the lips and tongue. The muscles of the eyelids and face feel the paralysis. Then the victim shows a staggering, shuffling gait. His muscles become tremulous and shaky. If he tries to write he only makes a scrawl; if he tried accustomed labor he fails and often does damage.

This disease begins in the higher nerve centres, those which are supposed to underlie mental activities. Then it involves lower centres — those of motion, sensation, and special sense, and the general functions of the bodily organs — nutrition and secretion.

But the higher centres are destroyed before the centres of the heart, the lungs, and general nutrition are deeply involved. The mind sinks away into imbecility and this fades into coma and oblivion. Complete paralysis of the muscles exist and the patient is only the semblance of a human being — a form without intelligence or motion.

The close observer of a fit of drunkenness in a periodical inebriate will not fail to see the intimate likeness of the debauch to the course of the insanity known as general paralysis. The preliminary symptoms of a debauch are usually those of despondency and the evidences of a weak will. This is a symptom of the disease of inebriety. Then the drinking begins, and the usual succession of

mental exaltation, mania, delusion of grandeur, as well as imbecility, paralysis, and coma follow.

The alcohol first poisons the higher cerebral centres. The functions of the mind are perverted; perverted brain functions, from the standpoint of mind, can only be understood or defined as insanity. There is no definition of insanity, except that it is functional perversion of the mental faculties, as the result of direct or remote consequences of poisoning or deformity. As the poison begins to act the inebriate is stimulated. He shows increased mental and bodily activity. He is talkative and confidential. He loses his personal restraint. He respects no decency of life, no confidence, and no trust. He is lavish with expenses and is inclined to have a very comfortable opinion of himself, even if he have no well developed delusions of grandeur. Often he becomes maniacal and belligerent, and is arrested and imprisoned. If he is able to control his most debasing inclinations among his neighbors or business friends, he throws aside restraint when he goes home and his family suffers correspondingly. At the close of the debauch the inebriate descends from mania to imbecility. He is incoherent, tongue and lips are paralyzed, speech is thickened; then he sinks away into coma with paralysis of all voluntary muscles — the semblance only of a human being; after several hours of comatose sleep, if death do not follow, he awakes to repeat his horrible round of debauchery.

But these conditions, which resemble each other in all signs and symptoms and are alike only in relation to duration, are caused by poisons. In both instances the higher nerve centres are first diseased, then the poison invades the lower nerve centres. In each case excitement, delusion, mania, imbecility, coma, stupor, and paralysis are the regular succession of signs and symptoms.

If one condition, from the standpoint of the mind, is insanity, the other is equally insanity. They are alike in cause, in results, and in termination.

But all insanity is periodical in greater or less marked degree. In many insane people the periodicity is not well marked, but is always demonstrable. All lunatics have their "lucid intervals," so-called, or, at least, they exhibit intervals of comparatively less activity of the manifestations of disease. In this feature inebriety resembles lunacy of other kinds. In inebriety and in all other kinds of insanity the manifestations of the disease are a periodical return of the severe symptoms at periods of greater or less duration, followed by corresponding periods of abatement of the more active symptoms of disease. In some types of insanity relating to duration of the rhythm or periodical manifestations the "lucid interval" is so clearly marked and of such long duration that it is called circular insanity. The meaning of this is that, imagining the successive periods of active lunacy and less active to be adjusted on a circle, the turn of the

circle brings around the active insane manifestations at long periods of duration, followed by long periods of lucidity.

The technical definition of circular insanity is that the periods of acute mania are succeeded by long seasons of melancholy. These two alternating conditions make up the disease. The melancholia may not, in all these cases, be marked, and many lunatics during this stage are credited with sanity, because they are liberated from asylums as cures; or if kept at home, they often resume their occupations. They are, however, during these intervals, insane. Inebriety exhibits the same phenomena. I regard the sober interval between debauches as one of the normal, or, rather, pathological conditions of symptoms of the disease. No poison can act on the higher centres of the brain of the cerebro-spinal system in sufficient degree to cause perverted action of the will, the intellect, sensation, and motion without causing perverted activity of the mental faculties; this is insanity when considered from the standpoint of the mind. All symptoms of drunkenness are the symptoms of insanity. If any ordinary observer of human mental and moral conduct sees a drunken man and is made to believe that the man has not been drinking, then the observer will at once say that the man is insane. There is no other way to explain or account for the symptoms.

The reason that drunkenness is periodical is because when a man begins to drink he does it periodically. The nerve cells are educated to demand

poison and reject it periodically. It is a matter of training or education. It is impossible to drink alcohol without causing poisoning and a variation of the poisoned cells, with the other results subject to the laws of poisoning.

The symptoms of inebriety are, as I have previously said, a craving for liquor, a maniacal debauch, followed by disgust for the poison, repentance, remorse, and a period of sobriety. All these symptoms, from the mental standpoint, are insane perversions of the mental faculties.

The most deplorable type of insanity caused by alcohol is delirium tremens. This insanity follows a prolonged debauch and is one of the methods by which it is brought to an end. The immediate cause is usually the inability of the inebriate to longer consume alcohol, and the nerve cells and nerve centres suffer because all nutrition, alcohol and food, is impossible to be retained. There is no doubt that the condition may be caused by an oversupply of alcohol; the poison in fatal cases can be found in the brain and other organs of the body unchanged.

But whatever condition prevails the acute insanity presents nearly the same symptoms. The functions of the mind are perverted, as are also those of sensation and motion. The higher centres, representing the mind, the organs of special sense, the centres of muscular motion and those of nutrition are perverted or abolished altogether.

The insanity usually begins with hallucinations

of special sense organs and the vision is most pronounced in perverted action. The inebriate sees spectres, animals, ghosts, goblins, spirits, dragons, devils, etc. These visions are so real that delusions follow; the victim believes what the appearances tell him; acting on the defensive he requires restraint to prevent him from doing violence to his attendants and himself. This case of delirium is insanity of mind, of special sense, of sensation, motion, and nutrition. His physiology is a jumble of incoherence of the mental and bodily faculties and functions. He is a maniac of the most violent type. His special senses cannot represent true impressions to his mind, nor can his mind receive them. His muscles are tremulous and his conduct and movements uncontrollable. This condition of sleepless mania lasts from three to five days, when recovery or death is the result; but while it lasts it is the clearest type of insanity. Digestion, assimilation, secretion, excretion, will, intellect, consciousness, and special senses are each and all insane.

It is well known in most cases of long continued inebriety that secondary diseases of the nervous system are the results. Alcohol may not be the direct cause of all these secondary diseases, but it is the predisposing cause. The nervous disorders are characterized by a hardening or, else, degeneration of the nervous tissues — the brain, spinal cord, and the nerves of motion and of sensation. One of these remote results is paralysis of the lower limbs from disease of the spinal cord. Then the

trophic nerves, which nerves control the nutrition of the body, become hardened, or degenerated, or inflamed. As a result of this many organs of the body take on degenerative disease. The liver, heart, stomach, lungs, muscles, brain, and other organs undergo these changes which depend upon, for their first cause, the alcoholic disease of the nerves of nutrition. The organs are no longer rightly nourished and become diseased.

But disease of this character, when it attacks the brain, or even when the brain is not directly diseased, may cause insanity which is incurable and permanent in character. The result may be mania, but is more frequently melancholia. The result may be imbecility — even idiocy.

It must be understood that these results are not inebriety ; they are remote results of inebriety. A man begins drinking for social reasons. When he begins he is not an inebriate. But he drinks to intoxication. He is then insane for a few hours, but recovers and in time repeats the paroxysm. This leads to inebriety, a type of circular insanity, the characteristic of which is a periodical craving for liquor. The next step or stage is the remote lesions, which fasten disease, and perhaps permanent insanity, paralysis, or degeneration upon the inebriate for the remainder of his life.

The remote diseases do not cause the craving for liquor. They are not inebriety. They are the results of inebriety. If an inebriate, when in a stage of debauch, falls and breaks his arm, the

broken bone is, in a sense, the result of inebriety, but it is no part of the disease of inebriety. It is no doubt true that many of the remote diseases of the bodily organs having the character of tissue degeneration are caused by weakening the resistance of the bodily organs to the assaults of the microbe of disease, rather than to the direct action of alcohol. The cure of the craving for liquor, or the inebriety, does not cure the remote diseases caused by alcohol, neither do these diseases prevent the cure of inebriety. The relapses are not apt to occur, however, in those who are victims of insanity from the secondary lesions caused by alcohol. These persons will resume drinking, not because they have a craving for liquor, but simply because they are insane.

The social relations of the insanity of inebriety are indeed complex. The social results are truly most wretched. All other causes together operate less in bringing domestic unhappiness and misery than does the lunacy of drink. The insane inebriate's family are the sufferers. They suffer from poverty, direct abuse, often murder, and from social and moral degradation. The inebriate's wife braves the chances of violent death, of poverty, and of certain domestic misery in being compelled to be the keeper of a lunatic. Society licenses the cause of this insanity, but uses no method to prevent the result of the insanity upon the family of the inebriate. No inebriate should be tolerated by any community. He is an insane man with homicidal and

suicidal tendencies. Other insane people are taken care of for their own safety and that of their families and for the public good.

Society cannot deny the insanity of the inebriate, but is slow to acknowledge the truth, because drinking is so universal a custom, and because so large a portion of the people are inebriates. The time must come when inebriety will not be tolerated, no matter how mild the type of the disease; public sentiment and the laws will compel the inebriates of all civilized communities to seek the means of cure.

The most important subject in political economy, ethics, and religion is inebriety.

CHAPTER XX.

IS THE DRINK HABIT A VICE OR A DISEASE?

FROM the biological standpoint the discussion of the question whether drinking is a vice or a crime is superfluous. However, it is before the people and I will consider it in relation to its bearings.

To the physiologist it can have but one reply. The physiologist and pathologist know that disease is physiology modified by deformity, injury, or a poison. The resultant of either of these forces, resisted by a physiological force, is what causes a disease, or any disease. Now, reversing the proposition, we find that alcohol is a poison and that it is resisted by whatever physiology it comes in contact with when in the body, and hence alcoholism is a disease. The solution of the problem must then read: Whenever a man has the drink habit, by reason of alcoholism, the habit is a disease or the result of a disease. This covers the ground so far as alcoholism is concerned. But speaking from the material basis we must account for the mass of drinkers and drinking; and as comparatively few of the drinkers have alcoholism, a reason for the consumption of seas of alcohol must yet be given. I will consider this question later.

But I wish to consider the drink habit further in relation to the believers of the doctrine that drinking is a moral or rather spiritual vice, or those reformers who work on material lines by spirit forces. I mean the Christian endeavorers in this field of reform; the people who argue that drinking is a vice, because they want to cure the vice by atonement and forgiveness and to work reform by creating a faith in the curative power of religion or its personal representative.

I have no doubt that religious belief, or faith, or dominant ideas will prevent even an alcoholic from drinking, or even prevent the masses from drinking; but drinking is universal throughout christendom. If I were advising the treatment of drunkenness by religion I should certainly recommend the religion of Mahomet. I need not give the reason; everybody will know the reason.

I have stated that alcoholics drink because they are alcoholics, but that not all drinkers are alcoholics. A greater part of the liquor of this world is drank by men and women who are not alcoholics, do not become intoxicated or diseased to any great extent, and are not the subject of prayers or curses by reason of the liquor they drink; yet I venture to suggest that there are many wine-cellars in this country dedicated to secrecy at least. But looking at drinking as it is I will try to account for the habits of the people who drink from other causes than drunkenness and its diseases.

In the first place people drink because they have

other diseases. Ever since the landing of Noah after the flood and the Cana wedding alcohol has stood by the sick bed and has held the lamp for feasters and revelers. It has waited upon birth, sickness, injury, pain, joy, marriage, revelry, and death alike. If drinking is a vice only, then the prescription is a crime. Alcohol is the instinctive remedy for injury, for sudden illness, for pain. It is not the least among the remedies used by physicians, and is acknowledged to be beneficial and an antidote to disease and disease infection. As a medicine alcohol antagonizes disease poisons which depress the action of the heart. It antagonizes the physiological effects of the ptomaines of pathogenic microbes. It antagonizes the poison of sewer gas in the physiological perversions. It antagonizes fatigue, it antagonizes bodily waste, due either to labor or disease. It furnishes heat force, which is converted into work, labor, and other physiological force. It anæsthetizes sorrow, it stimulates joy, it kills microbes, it destroys ptomaines, it prevents the overformation of poisonous leucomaines during labor and during fever. Why, then, need we try to account further for the drink habit? Alcohol is medicine for rich and poor. It takes fatigue on its own shoulders and climbs the hills of toil with the workman. It sits up late with the genius and is consumed along with the midnight oil while dramas and poetry are written, machines are invented, fortunes are discovered, and campaigns are planned. If alcohol nerves the arm of the murderer, it also

nerves the heart of the fever patient. If alcohol is the genius of the gambling den, it is also the emblem of the blood in the commemoration of the Lord's Supper. If it is crime, it is also sacrament. If it is poison, it is also medicine. If it murders, it also saves. If it causes disease, it also heals. If it is a law-breaker, it makes the laws. If it is an outcast, it is also clothed in purple and fine linen. Alcohol carried in a little tin pail by a forlorn and ragged child is degradation; alcohol in a "new bottle" covered by the valued cobwebs of age and the dark cellar, borne by the butler to the table of the millionaire, is aristocracy. When the man of the family is a drunkard and the wife's wages go to the saloon-keeper, then alcohol turns the happiness of home to poverty. But alcohol pays the pensions of the veterans who saved the country and piles up the surplus in the treasury whereby Wall street is saved, the national debt is paid, and great "appropriations" are successfully carried out and the new navy constructed.

But in addition to the necessity of religious observance the drink habit is bolstered by the contagion of example. Habit is contagious. It is not transferred by a germ or microbe, but it is transferred by imitation. Nervous diseases are transferred and propagated among the people in a similar manner. If one girl in a boarding school has hysteria, the disease may be spread by this sort of contagion. When one sinner at a camp-meeting has convulsions, the disease is likely to spread.

Whole states and small communities, boarding-houses and seminaries have in this manner adopted the convulsion method of nervous activity. Mohammedanism, Buddhism, and Mormonism, as well as other religious beliefs, were propagated in the same manner. Popular manias have also been propagated likewise. The crusades were inaugurated by such a movement. The children's crusade, a similar affair prevalent among the babes in the beginning of the thirteenth century, was a contagious mania. The tulip mania originated in Holland, that country of dikes and wooden shoes and hard heads, and spread all over Europe in 1636 and 1637. In those days a tulip bulb would sell for the price of a prince's ransom, could pay for a principality, could emancipate a slave, empty bank vaults, rob beauty and vanity of their jewels, and make and ruin fortunes.

In our own day, in addition to the mania of convivial drinking, we are probably just entering the trotting-horse mania. The trotting-horse is the noblest of all animals, but the utility of trotting does not warrant the prices this animal will already bring. Axtell sold for $105,000. Any "fashionably bred" animal with a record at three years of 2:15 can be sold for from $20,000 to $75,000. The effort is to get the two-minute trotter,— a purely contagious sentiment from the standpoint of utility —and by the time the four-year-old two-minute trotters appear, as they certainly will, they may sell for half a million and upwards. What wonder is it,

then, if the drinking custom has been a contagious mania for centuries throughout Christendom; that the custom is as universal as Christianity and the institutions of governments. Drinking is as universal as devotion and the franchise. The drink habit has permeated society by contagion and other causes so like a leaven that it is the contemporaneous institution of all the works of humanity and the wealth of nations. If the drink habit peoples the almshouses and the prisons, it is at home under the great rotunda at Washington. If it fills the coffers of the wicked, it also pays the rental of many houses owned by the virtuous, even by men high up in the political and religious synagogues.

But not the least among the causes of the habit of drinking is heredity. I will mention the fact here, but I will explain the relation more completely further on. I will say here, however, that I regard the hereditary drinkers as the so-called temperate drinkers. I do not consider inebriety as a necessarily hereditary disease. Heredity protects people rather than destroys them. The known laws of heredity build up a protection or an immunity to poisons of all kinds. Men acquire immunity from diseases by heredity. The men who are exposed to typhoid, measles, diphtheria, smallpox, scarlet fever, typhus, etc., and do not take the diseases, are the men who have acquired the power of resisting these poisons. They acquire this power either directly by the action of the poisons themselves, or they acquire the resistance from their poison-leavened

ancestry by the law of heredity. The law of heredity, as a factor of natural selection, has brought mankind out of the wilderness and bonds of iniquity imposed by poisons, or is bringing them out.

Consumptives do not inherit consumption, but they are those who have not yet acquired by heredity a resistance to the microbe of this disease. Inebriates are those who cannot oppose the poisoning of alcohol by means of the vital resistance of their tissue cells. Any native Indian or Australian or Hottentot, if given whisky, will become a drunkard. Not one Christian American or European in a thousand will become a drunkard under precisely like conditions. The reason is that the European and American inherit a tolerance to the poison from a long line of poisoned ancestry.

With one exception, which I will explain, heredity has but one method of propagating disease. The law or force of heredity saves people from disease. Immunity from the action of poisons is only given by the action of poisons themselves, and this immunity so acquired is what is transmitted by heredity. The man who can inhale sewer gas containing tubercle bacilli and escape consumption is he whose ancestors have so long been poisoned by this microbe that they acquired an immunity to the poison. Now this man can, very likely, "put a glass of old rye under his vest" every morning or before dinner, to enjoy the pleasure of the exhilaration therefrom, and never lose his "self-control," as

he proudly calls it; which habit he may keep up during his natural life without "alcoholism" or drunkenness, or any of the lesions alcohol may cause. It is not because this man has more self-control or Christianity than other men. It is simply that he inherits more vital resistance to this poison.

But now, to conclude the argument on the vice or disease relations of the drinking habit, let us further consider our same individual who can resist both the poison of the microbe of tubercle and the poisoning of alcohol. Is it a vice for this man to swallow tubercle germs and whisky with his breakfast or not? In one case it is, perhaps; but in another it is not. So long as tubercle germs and alcohol exist the only method of acquiring an immunity and keeping it up must be by more or less continual exposure to both poisons — unless a substitute cure is discovered. If this man is no longer exposed to consumption poison, and his children are exempt, in time they will again begin to have the disease. The same rule will hold good with alcohol. The question will come up now: If there were no alcohol in the world and no consumption microbes, then could all this trouble be avoided? Most certainly it could, but the most short-sighted people on earth are the prohibitionists. The reason is easy to give. These people do not seem to know that the poisons of this world are antagonistic to each other; that the poisons of disease are antagonized by so-called remedies which are also poisons.

They forget that though alcohol is a poison, it is also a remedy for the poison of disease. The difficulty of prohibition arises from the fact that the public will not be deprived of a remedy which is so convenient and easily manufactured. Call it charm and delusion, and drunkenness a vice and indulgence, if you will, but the fact remains that if prohibition ever succeeds it will be after the banishment of the infections of disease and their poisons. If the good people who are agitating prohibition would turn their attention to sanitation and prohibit disease infection, the question of alcohol prohibition would take care of itself. You cannot prohibit ether, chloroform, morphia, alcohol, or the long list of antiseptic poisons from the use of man while injuries and surgery and disease poisons inhabit the earth. Yet ether and morphia and alcohol, arsenic, cocaine, chloroform, and other poisonous remedies are used as intoxicants by poisoned people, who have learned to love them and become their slaves. Why not prohibit them all? The answer is that while disease is in the world the people will not allow these poisons to be prohibited, no matter how much more injurious the remedy may be than the disease.

When an astronomer studies stars, moons, planets, and nebulæ in their physical relations of mass and motion, he applies the well-known general force of gravity and the law of attraction in order to understand these relations and be able to explain what he learns. When pathologists investigate a disease, do

they do it in the light of the general laws of biology? I find that they do not. I do not happen to know of a pathological work, or a book on physiology, written by any person who appears to have ever read the biological law of natural selection, or who appreciates the laws of organic evolution in relation to the subject. The pathologist, writing on consumption, will say that the disease is hereditary, citing the history of many families, perhaps, to prove his position. In fact, this idea is so firmly grounded in the public mind that even state boards of health and life insurance companies believe that consumption is an hereditary disease. Likewise, writers on the pathology of alcoholism declare that the disease is hereditary and cite notable families who all became drunkards as the example and proof. Now these writers omit a factor or two from the problems. They do not know the relation of poison to the tissue cells and the acquirement of a tolerance to the poison by variation of the cell so poisoned. It is this variation in either case which is transmitted by heredity, and it follows, therefore, that the inheritance of all disease, in time, is an immunity from poisons and not the transmission of diseases.

I hold that alcohol acts by poisoning, producing certain modified physiology relating to coördination, motion, and sensation, recognized by everybody as "intoxication." This condition is acute or chronic, so-called, corresponding with the fact whether the poison is continued from day to day or

is taken for only a short time. Chronic alcoholism is simply a continued series of "drunks," or acute intoxications.

Alcohol poisons the tissues having least resistance to its action, which are the nerve tissues. It is this fact, viewed obversely by certain writers, who say that alcohol has an "elective or selective affinity" for the nerve tissues. There is no such thing as selective affinity in pathology, or in the relation of any poison to any tissue. No tissue "selects" any poison, but they all resist it with greater or less success.

Alcohol being taken in "excess," what is not consumed by oxygen and converted into heat and correlated into cell energy circulates in the blood, and, of course, reaches all tissues. It coagulates albumen to a certain extent, perhaps, but its effects are on the general physiology. It modifies cellular nutrition, reproduction, and special function and causes a variation in the cell of special character.

This variation of the cell gives the cell a greater or less amount of increased resistance to the poison. This law holds good with every poison and in all poisoning.

But before going further I will refer to the biological laws of natural selection, for the action of no poison can be understood without an explanation of these laws. The chosen people of God are saved and brought out of the wilderness of sin and poisons by the following factors: Variation, hereditary transmission by descent, and atavism. The

meaning of these factors will be understood as I proceed with the explanation in relation to alcoholic pathology. Now the alcohol is present with the nerve cells. The nutrition, reproduction, and special function are perverted. It is the perversion of the special function of the cell which causes the general phenomena of drunkenness. It is the perverted nutrition which causes the variation in the cell, provided the cell survives as an organism. If a debauch lasts several days, the man on the first day will make himself "blind drunk" on a pint of whisky; when he wakes the next morning he can drink a pint of whisky before breakfast and go down to the table steady enough, although smelling badly and showing the poisonous effects of the day's debauch. The second pint does not make him drunk. It requires a quart or more during the day to put him in the condition of the first evening. Now why is this? There is no possible way of explaining the fact except by the law of natural selection. The acute poisoning by the first pint of liquor has created a tolerance or an increased resistance to the poison. To get drunk again a larger quantity must be taken the next day. What happens next is the hereditary transmission of something. If the cells acquire something, they must transmit it. Like produces like, subject to variations during the reproduction. In this case the thing acquired by the cell and which it transmits is the variation which gives the new cells a greater power of resisting the poison and not the presence

of the poison; for its presence is now a necessity, but with an increased power of resisting the poisonous action. If the quantity of alcohol were not increased beyond the power of resistance gained by the variation of cells, the debauchee would not show further symptoms of "intoxication;" nor would there be further poisoning, provided, of course, all the tissues of the body had acquired an equal resistance.

The tissue cells are now, such as live at all, naturally selected to exist in the presence of alcohol. But this poison is now a necessity; let us see why.

If an animal is "selected" by nature to live on grass, we may assume that his teeth are adapted to browse and graze, and that the form of the teeth is a variation from that of a former type of animal which lived on some other diet. If a grass-eating animal begins to eat flesh, it may in time undergo a variation of teeth and stomach, have tusks and different molars, and lose its type of stomach. What will happen now, if the environment of these animals is suddenly changed? Suppose there is no grass for the herbivora nor prey for the carnivora. Suppose they are given a new kind of food; then a new variation must be undergone if the animals live; but the change would be anything but agreeable and would illustrate a feature of the struggle for existence. What would these animals do if they could? The grass-eater would wade up to his eyes in fields of waving grasses and the flesh-eater would agonizingly dream of the cattle on a

thousand hills and have an appetite that a whole menagerie could not satisfy. How is it with the debauchee? He must have alcohol. The reason is that when a tissue cell acquires a power of resisting a poison by variation of its type, the presence of the poison is necessary in order to carry on its special functions. If the poison is withdrawn, then the cell must undergo a new variation to enable it to live on food. In this condition of things alcohol is more or less a food for the cell. If the alcohol is withdrawn and a new food supplied, a new variation is required, and amid the variations to suit new conditions starvation may be the result.

Cells as well as individuals transmit whatever they acquire as part of their likeness in reproduction. Suppose each generation in a family, for one hundred generations, is subject to alcohol. By the law of heredity these people would acquire a great tolerance to the poison of alcohol. These are the people who consume the greater part of the liquor drank. They keep the wine cellars and drink alcohol in wine or beer at the table. They are not known as drunkards. They have the power of "stopping when they get enough," and do not get drunk. Their cells have undergone, by the influence of heredity and variation, an evolution which enables them to live on food and alcohol and enjoy the pleasures of the table and sideboard without imminent danger.

It is clear that heredity in alcoholism, by transmitting the power of resisting alcohol, acquired by

conflict with the poison, does not cause inebriety by heredity. The writers who cite their little cases wherein a man's son and the man are both drunkards do not know what heredity is or its scope when they limit its horizon to their narrow view. The fact is that this family has not yet acquired an immunity to this poison; the son probably drinks for the same convivial reason that his father did, provided he has no other disease. I do not know, of course, how many generations are required to gain an immunity to alcohol, but I do know what the laws of heredity are.

The same law holds good in disease poisons—the ptomaines. Take consumption, a disease which stands at the head of the class as a hereditary disease, as estimated by some people. The disease can be directly transmitted to the fœtus by the mother; but all heredity in consumption consists of weak resistance to the ptomaine of the germ. One person in seven dies of this disease. The disease is contagious and all people are equally exposed. Why do not all people take disease? Simply because all families, except one in seven, have acquired an immunity to the poison of the ptomaines. The long line of consumption-afflicted ancestry has created a tolerance to the poison of this disease. The persons having the immunity transmit a like immunity, while the persons having a weak resistance transmit that.

The pessimist is a short-sighted, or narrow-sighted man. This man has no periscopic vision

either. He can see the figures or factors that are just before him, but he cannot see all the factors of any problem. Hence his conclusions are vain and his opinions pessimistic. The optimist can see more than one man and his son in the problem of heredity. He looks along the family line or even the history of a nation for ages and generations. He sees that natural selection brings nations out of the bondage of species, parasitism, disease, sin, poison, poverty, ignorance, and immorality into civilization. Heredity cannot cause evolution and bring people out of this bondage by transmitting evil alone. Heredity alone by transmitting likeness might not improve species ; but heredity looks out for the fruits of victory and transmits an increment of variation with every generation, which helps the race in every relation. It is natural selection that gives people an immunity from poisons ; that adapts plants and animals to their environment ; that enables them to resist diseases and to obtain a living and to live.

The next factor of natural selection is atavism. The meaning of this is that it is a reversal or return to a former type. If a debauchee is forced to abstain from alcohol by his stomach, his nerve cells are placed in a new condition or environment ; if the latter is like that which preceded the debauch, then the cells will in due course of time assume their former type, or nearly so. This is atavism, or variation backwards. It is always the environment or something in the environment — food, or poison, or

station, or enemies — which causes variation in cells of animals and plants.

A distinguishing characteristic of alcoholic poisoning is the rapidity of its action upon the cells. The cells will acquire a variation enabling them to tolerate poisonous doses of alcohol in twenty-four hours. On the other hand the recovery of the poisonous cells, which simply means their atavistic variation, requires only a few weeks' time, without treatment. The rule is very different in morphia poisoning. The acquirement of the "morphia habit," or the variation of cells caused by morphia, which enables them to tolerate the "drug," is brought on much slower. It is next to impossible for an opium user to control his "appetite" for morphia. The atavism of the cells is so slow after the drug is withdrawn, if there is no cure, that the patient will relapse. Poison differs very greatly in this respect. Chloroform, ether, and alcohol are very rapid in poisonous action. The cells quickly acquire their variation, and they soon lose it. The ptomaines of disease act more slowly. Two or more weeks are required in each of the acute diseases to establish a cell variation, giving a tolerance to the poison, and the cells may hold this variation many years. While the tolerance lasts the person enjoys an immunity from the disease.

I have now illustrated the factors of natural selection relating to poisons, with special reference to alcohol. I will ask, Is there any doubt, scientifically based, that natural selection is a true gen-

eral law in biology? If it is true, is there any other method of explaining the relations of poisons to animals and plants? There has always been too much "other worldness" used in the explanation of biological phenomena. Cosmas, who was startled by the mechanical theories springing up in his day, the middle of the sixth century, relating to astronomical motion, attempted to supplant all such heresies by the spiritual theory that the angels were kept very busy shoving the moving planets about. Most of our temperance reformers are equally spiritually minded relating to the use of liquor and its abuse.

I will now apply the law of selection to the acute diseases and see if they can thereby explain. All these diseases, small-pox, plague, typhus, typhoid, consumption, diphtheria, cholera, yellow fever, and all the rest of them, are caused by poisons manufactured by microbes. Let us see if the phenomena of disease are explicable by the law of natural selection. Any observer will note that in most acute diseases the disease has a definite period of duration; then, if the victim is not destroyed, he recovers, his damaged anatomy is repaired, and, for a longer or shorter period, he has an immunity from his disease, whatever it may be. The reason that the person is susceptible to attack at first is because he has no immunity to begin with. If a child has scarlet fever or measles the duration is very definite, and at the end of a certain time the disease will terminate. The disease terminates simply be-

cause the cells, in consequence of their battle with the ptomaine poison, acquire a variation which enables them to resist the poison. It is impossible for cells to be poisoned and live and not acquire a variation; the nature of this variation is always an increased power of resisting the poison. When the cells can resist the poison of any given disease, then the disease must come to an end.

If a child, when it recovers from scarlet fever or measles, is exposed to these diseases it will not take them—at least for a time. The reasons that have been given for the fact would constitute a "curiosity shop" in medical literature. Of course there can be but one reason; and if natural selection cannot give the reason then the law is not true. The reason is simply because the cells have acquired a variation enabling them to resist the poison and have not yet lost the variation by atavism. In some cases the variation will last a lifetime; in other cases it goes sooner. Some children will have the scarlet fever once; others will have it several times. Inoculation and vaccination are methods of preventing diseases which operate on this plan. The virus used is always the same ptomaine that causes the disease. The poison creates a variation in the cells enabling them to resist the poison of the disease. Small-pox, anthrax, chicken cholera, swine plague, Texas fever, hydrophobia, and other diseases are prevented in this manner.

Alcoholism is an acute, or a series of acute poisonings by alcohol. I believe the pathology is lim-

ited to this condition. Acute poisoning means a modification of cell nutrition, cell reproduction, and cell special function. The cell modification of nutrition and reproduction causes a variation in the cell. As the cells which can resist the poison the least are the brain cells, the modified special functions result in the manifestations known as drunkenness. But our school books and medical journals are filled with alcoholic pathological nerve degeneration. Temperance literature is crowded with this sort of pathology, with spiritual cures. The trouble with our reformers would appear to be that they accumulate more pathology than mustard seeds of faith can reach.

Alcohol is distinct as a poison from other poisons, especially the ptomaines. It prevents degeneration if it does anything. Large quantities of alcohol lower the temperature. Ptomaines increase it and cause fever. Alcohol prevents bodily waste and the formation of leucomaines and their poisonous action, while ptomaines will double the amount of cell destruction and double the amount of excretion of carbonic dioxide and urea. Alcohol may cause degeneration of cells indirectly, as any poison may do, or any condition of life may do; but the direct action of alcohol, even in poisonous doses, is as I have indicated; and there is no proof to the contrary and never will be.

Alcohol has always been used as a medicine in ptomaine poisoning, or in fevers. It has never been discarded in its therapeutical uses by any except

fanatics who let their prejudices take the place of education. The drug is verified as an antiseptic and as a germitoxic. Every symptom or pathological condition of a fever, or ptomaine poisoning, is antagonized by alcohol. It furnishes, therefore, what is known in scientific therapeutics as the rational antagonism of symptoms in fever. It antagonizes the temperature, the cell metabolism and waste, the formation of leucomaines, and it also antagonizes the microbe. But most of all it antagonizes pain. In injuries alcohol antagonizes shock, pain, and blood poisoning.

The change produced in the nerve tissues by alcohol, speaking generally, is an isomeric change. It is not a degenerative change. Degeneration is of two kinds, metamorphosis and infiltration. These degenerations of metamorphosis are numerous and are known as colloid, mucoid, amyloid, fatty, etc. These metamorphoses are all results of ptomaine poisoning and sequent inflammations, except the fatty degenerations; and there is quite a probability that fatty degeneration may have the same cause. Alcohol does not cause true inflammation. It cannot cause pus, cancer, degeneration, atrophy, hypertrophy, measles, small-pox, grippe, pneumonia, ague, or consumption. It may have a predisposing influence in the etiology of these diseases. But there is no evidence that morphia, quinine, gold, mercury, belladonna, aloes, iron, strychnia, tomatoes, beef, gossip, infidelity, shavings, politics, envy, hope, or faith, either or all of them ever cause any

of the diseases mentioned. Alcoholism is a disease, of course, but the pathology has its limits.

I have studied inebriety for many years on these lines of natural selection and pathology. Assuming the great biological law to be true, then there is no escape from its application to the phenomena of poisoning and the cure of poisoning.

In general terms the treatment of morphia and alcoholic poisoning is like the treatment of other diseases — by antagonizing symptoms and conditions. The true physician, who has no hobby to serve and is not a mental slave to an edict or a dogma, will follow the methods of nature in his cures of disease. Looking at the first general principle of alcohol poisoning an expert observer will see that the method of cure or recovery from a debauch as exhibited by nature is the atavism of the cells ; which can only result, however, by either a sudden or gradual diminution of the poison.

I know of nothing more brutal than an enforcement of the rule to take away morphine or alcohol all at once from respective inebriates. The method is also dangerous. There is probably no physical or mental suffering equal to that which is caused by a complete withdrawal at once of the poison from the poison habitue. Yet this is the practice, I understand, in some of the so-called homes for the inebriate.

The law of atavism teaches that the cells when deprived of their poison are in a new condition of environment and, as a consequence, they must un-

dergo a new variation. If the conditions are the same as before the poisoning, then the new variation will be atavism, or a reversal to a former type. The cells, though in the midst of poison and performing their general and special functions, with the characteristic modifications of the poison, yet experience a great difficulty if deprived of the poison. Any cell or any animal, when it becomes adapted to its environment, experiences like painful difficulty if it is suddenly removed to a climate or condition which deprives it of one of the principal necessities. In time the cell or animal or plant can, by variation, adapt itself to new conditions; but time is required in the organic variations of the cells of men and plants.

The scientific and humane method, then, of treating an inebriate, no matter what the poison, is to gradually reduce the "drug" and bring about the atavism of the cells by equal methods. In alcoholic poisoning this can be done in a comparatively short time. My treatment combines food principles with an alcoholic preparation which supplies the needed nerve nourishment, and the drug required to secure atavism of the nerve cells speedily and easily.

I will say that in the discovery of my method I did not follow empirical experiment alone. I investigated the question on the lines of natural selection relating to pathology. As pathology (disease) is caused by poisons, I learned that cells acquire an immunity from poisons by being poi-

soned. I learned that this immunity lasts very long in ptomaine poisoning, but is short in other poisons — mineral poisons and poisons like alcohol. I finally learned that certain well known drugs will obliterate the vestiges of variation, or whatever changes there may be in nerve cells after long use of alcohol and other poisons.

CHAPTER XXI.

THE CURE OF INEBRIETY.

THE history of medicine is silent on the cure of drunkenness. For this disease the record of science gives no remedy. The clinical history of drunkenness must be looked for in the records of criminal courts rather than in the multiplied volumes of the science and art of medicine. These records show that police justices and policemen have been the physicians and nurses of the drunkard. The poison which causes a fever has been attended by science, by sympathy, and by all the arts of medicine ; but the poison of alcohol and its bloated diseased victim have been outcasts. When the fever patient dies love goes into mourning with all the costly panoply of woe, but when the drunkard dies shame is the chief mourner. Alcohol, though a poison, is regarded as a dispensation of Providence ; but alcohol is the poison of dishonor and the inebriate's life and death are a reproach.

Mental disease was once credited to demoniacal possession. Insane patients were confined and treated with the lash and other punishments. So strong a hold did this idea have on the public and professional mind that a scientific knowledge of this

disease and its humane treatment is scarcely more than a quarter of a century old. Thirty years ago it was a very rare thing for the faculties of medical colleges to teach anything on the subject of insanity.

It is truly very difficult to draw the line between moral and vicious mental manifestations. In older days any disease affecting the mind so as to cause vicious symptoms was apt to be charged up to some evil spirit or moral depravity on the part of the person. The remedy was naturally punishment. One by one the whole list of nervous diseases, as insanity, convulsions, imbecility, and inebriety, is passing over from the domain of ignorance and brutal treatment into that of science and cure. The idea that drunkenness is a disease and is curable came to me like an inspiration. It first startled the medical profession as the light from heaven did Saul of Tarsus, when he was aroused from his errors and became Paul the apostle of the gospel of righteousness. Drunkenness is now being slowly recognized as a disease by the medical profession, although it is a disease readily curable. Within a few years many thousands have been cured and are now well. In all the history of diseases this is the first instance of an epidemic of cure. Heretofore all epidemics have meant disease and death.

In the future inebriety as a disease will have its place in medical practice. Its pathology will have its place in medical books and medical science and teaching. There will be fewer inebriates in jails and more of them in hospitals. There will be fewer

fines paid by drunkards and more fees for cure. The reproach of drunkenness will be that it is not cured, since it is curable. Public sentiment will not tolerate inebriety; and the neglect of cure on the part of the patient will compel him by law or by force to subject himself to a cure. Religious and moral societies and benevolent people will create a fund to support the inebriate hospitals; the states in severalty are already beginning to do this; perhaps our wise men will divert a portion of the liquor and saloon revenues to cure the consequences of alcoholic consumption.

The value to the family and state of the discovery of a cure for drunkenness is almost incalculable. In the balance against human suffering, family poverty, and wretchedness there is certainly no estimate of its value. It is beyond calculation. It almost by itself solves the great problem, "Is life worth living?" and to thousands upon thousands of families it can give a sufficient answer to the question, "Is marriage a failure?" Life is not worth living if the life is poisoned; and the great unit of communities, the family, which is based upon marriage, if subjected to poison, very readily demonstrates that it as well as marriage is a failure. But cold calculation has a unit for measuring all values, which is the dollar. The value of a man's worth to the state is based upon this unit of calculation. A drunkard is of no particular value to the state or to the family. In fact the drunkard is an expense; his value is a minus quantity, or a negative value. He

is the cause of large police organizations; but for him the expense of bridewells, jails, and penitentiaries would be very small. A dead man is no expense. A drunkard costs the state money, and persons and property are both in peril through him. A drunkard wastes property. He lives on another's wages. He causes family degradation and sorrow.

A cured inebriate is restored to manhood. He at once becomes industrious. On an average the wage basis of calculation can be employed to estimate his state value. By this criterion we will say that he earns by labor one thousand dollars annually, which is a fair average for the class of men cured at my institutes. Given a thousand men and it will be seen that they will earn a million dollars a year. When it is considered that these cured men run into many thousands, the total benefit reaches a great pecuniary value. These men have all resumed payment and earning as well. They are worth this money, on the average, to the community. The difference, from the moral basis of value to human life, is that to these men life has become worth living; while their wives — and the rule is that these men have the noblest wives among women — the verdict of these women is that marriage is no longer a failure.

It does not follow that all drunkards are worse than dead men, or that all drunkards are criminals and are not bread winners; but no one, I think, will deny that, measured by the almighty unit of value, any drunkard after he is cured and reformed is

worth one thousand dollars annually more to the state than when diseased and unregenerated.

People naturally ask, Why is it, if every man's life is worth so much to his country, and drinking makes him useless, that the state does not prevent the manufacture of alcohol? In reply to this question I will briefly answer, that alcohol cannot be prohibited because the social conditions, and particularly the sanitary conditions of civilized countries, are such that the demand for alcohol cannot be overcome.

I regard good sanitation as the one great essential element of temperance. I regard bad sanitation as the chief and great cause of intemperance. People who want to secure prohibition should secure sanitation. Prohibition would follow this as naturally as the trailer follows the car that carries the motor. No legislative enactment could make a buggy pull a horse up hill. People who pray that results may overcome causes in this manner are not likely to get an answer to prayers. But the people who pray that prohibition may prevail and who then go to work and clean up this earth, and put a stop to its pollution by putrefaction — thus ending the unholy death rate of thousands of people annually, in every country, by diseases that are simply public homicide — these people will some day see their prayer for prohibition answered.

But to-day alcohol is king. It is equally at home in human blood and human brains, whether the body is clad in silks or beggarly rags. Alcohol

is the glory of the rich man's sideboard and the concentrated wretchedness of many a poor man's cupboard. It is the chief medicine in preventable diseases. It lowers the temperature of fever and averts the threatened heart-failure in disease and injury. It antagonizes the polluted atmosphere, which carries with it into the lungs and blood of poisoned people the vapors of putrefaction. Alcohol is the instinctive remedy of the people of all Christendom, for debility, for fatigue, for disease and injury. You cannot prohibit alcohol from a people who overwork, who are unduly fatigued, who suffer from diseases that they should prevent and from accidents that are always resulting from the haste and carelessness of a hasty and careless people.

Other diseases cause people to drink. These diseases may have no possible connection with alcoholism, except the relation of association. People who are insane or have other nervous disease may suddenly go to drinking and develop inebriety. Usually, however, such persons become opium inebriates.

The disease of drunkenness is caused by nothing else than alcohol. It is not inherited, therefore. The doctrine that drunkenness is hereditary is a violation of all known laws of heredity relating to poisons. The poison of scarlet fever is required to cause that disease and scarlet fever cannot be inherited. The same rules apply to consumption, typhoid, diphtheria, and all other similar diseases.

Probably not more than one drinker in twenty-five becomes a drunkard. The other two dozen keep wine cellars and sideboards, visit saloons, carry a bottle in their pockets, take alcohol as a medicine, drink socially and drink whenever they please, but they do not become drunkards.

If seven persons are equally exposed, only one will acquire consumption. The rule is that one out of every seven people born dies with this disease. Why do the other six escape? The reason is because they inherit an immunity or protection from this disease.

The same rule applies to alcohol. The nations of Christendom have been drinking whisky for centuries. The reason these nations are not "half seas over" all the time is simply because so many of the people have inherited a greater or less protection against the poison of alcohol that drinking does not make them drunk nor make them drunkards.

But a certain per cent. of drinkers, whatever it may be, become inebriates. We all know this disease from its symptoms. These are a periodical craving for drink which nothing but a cure of the disease, except in very rare instances, can prevent.

Alcoholism, or drunkenness, is readily curable. It is easier to cure than any other disease. In fact it is the only disease that can be said to be curable at all; for the general rule is that other diseases are cured by natural laws. We all know that the diseases consist of a forward and backward variation of cells of the tissues, caused by periodical poison-

ing. This variation and atavism, after long continued inebriety, becomes a habit, or an instinct of the cells. There is no stronger motive of force of mind than habit. Habit, which is the result of poisoning, is a diseased habit, or a habit of disease. The habit of alcoholized tissue cells is as powerful as the instinct of migratory animals, which recurs periodically, from long continued customs of ancestry. A migratory bird, tamed and housed and living luxuriously and sumptuously every day, with no possible reason for migration, will, at the appointed time, migrate if it can. The reason in such a case is not because of the original necessity of climate, but the cause is the inherited function of the nerve cells.

The drunkard has nerve cells, and probably other tissue cells, which have acquired the same sort of rhythmically recurring habit for drink. The cure of the drunkard consists in breaking up this nerve habit. You know just how it is. When a drunkard ends his spree he swears off. He promises himself and wife, and all friends, society and business and church that he will drink no more. The migratory bird has come home to stay. But at the appointed time, when everything is going well, when there is no possible reason, off goes the migratory bird on another disgraceful drunk. No society, no pledges, no family endearments, no crisis of business, no love of holiness or of the Lord can prevent it. The nerve cells have swung back on the pendulum of acquired

habit to the other end of the segment, and the "tick" must follow.

I have learned that certain drugs and methods and discipline will effectually break up this cycle of nervous habit and rhythm and will cure the inebriate. I believe that this discovery will mark an era of human development. It will lengthen life. It will destroy much sorrow. It will increase the working force and prosperity of the world. If men live longer and live soberly, they can think more; and when men think freely, the world goes on toward the high work of human destiny, which must destroy poverty, destroy disease, destroy sorrow, and bring about the perfect moral code of the millennium.

CHAPTER XXII.

TREATMENT OF INEBRIETY AND OTHER DISEASES.

THE world emerged from the dark ages of general science and intelligence nearly four hundred years ago. The scientific question relating to the human mind hinged on the change of deductive to inductive reasoning. Before this epoch in mental development if a man studied the phenomena of electricity he did it by the method of introspection, just as he studied mental phenomena. Before this period "philosophy" dictated all general facts of mind, body, soul, and universe ; all mental and physical phenomena were explained by deduction from these data of philosophy. The data of all these philosophies were imaginations. They were dogmas. They were formulated into creeds. There were no experiments, no studying of natural phenomena. It was all that a man's life was worth in those days to dispute the dogmas of philosophy ; new discoveries in natural science were frequently illuminated by the faggot fires of human sacrifice.

But to-day old philosophy is dead. Introspective generalities and philosophic dogmas have folded their tents like the Arabs and as silently stolen away —into oblivion. There is no longer any philos-

ophy in the scientific world except the generalizations of science derived by induction through trial and experiment. Human belief in scientific questions no longer asks for personal authority. There is no personal authority. There is no criterion of scientific truth except the verification of experimental trial. If personal authority is ever quoted it is because such person has furnished the verifications of science by experiment. Dogmas of science were mediæval giants armed with spear and shield. They were supposed to be an invincible army. They conquered and ruled the world. But scientific verification, a mere stripling, armed with pebbles from the little rivulet of thought, brought these giants of human superstition to the earth, as David vanquished the hero of the Philistines.

When the dogmas of philosophy were dead science was born. The method of logic was inverted. Instead of verifying special facts in nature by deductions from philosophical generalities, the wider inductions of science, as proved from special facts, were set up in the place of the supposed dogmas of philosophy. Modern philosophy is created in this manner. Even in the domain of mind and conscience the objective method of study is employed instead of the introspective method.

The new method of thought and reasoning is employed in all science and in all the special arts and sciences. The great development of electrical science, with its cars, telephones, telegraph, and artificial light, were all derived from patient experi-

ment, trial, and induction. No man could ever have invented these things by introspection, or by deduction from the dogmas of old philosophy.

But medical science has exhibited the slowest development under this method of thought, as compared with other applied science. In fact, eighteen years ago there was no medical science. The art of medical practice was based upon the empirical relations of drugs to the symptoms of disease, but physicians did not know the cause of disease. The consequence of this was the creation of scientific dogmas, to take the place of scientific inductive truth. The last eighteen years has presented an object lesson to the world of the great difficulty the human mind experiences in removing a dogma from its pedestal and erecting in its place the graceful statue of truth. The discovery of the microbe as the cause of disease and its final acceptance by the medical profession, and the crowning of the mythical deities of medicine and hygiene with the laurel of science are all within our observation and memory ; yet this work was only done after great opposition and much bitter controversy.

But having at last been accepted the great labor of conquering disease is making rapid strides. There is no doubt that the great single remedy, a universal germitoxic, or microbe destroyer, will soon be made known. A single cable connects the thought and business of Europe and America. Science always simplifies all things. Before the telegraph cable was laid through mid-ocean a thou-

sand sail and steamships did this work, by mail or by messenger. Before the discovery of the cause of disease there were a thousand remedies for each disease. As scientific investigation advances these useless remedies are falling by the way. When medical science has reached its full development there will be a single remedy for the destruction of the microbic origin of disease.

Only a few years ago inebriates, when not punished by imprisonment or other penalty for drunkenness, were placed, if desirable, in asylums or hospitals for treatment. These asylums did not recognize a single cause for inebriety, and their remedies were as numerous as the symptoms, whims, caprices, and opinions of both the physician and patient. No single cure for this single lesion, having but a single cause, was recognized. Months or years of time, with drugs innumerable, with seclusion and with loss of liberty, were employed to cure an inebriate. But to-day the disease of inebriety is known to be a single pathological lesion, having a single cause, and curable by a single remedy. If a multitudinous array of remedies ever happened to cure a disease, it is because one of them happened to be the proper cure. If a sparrow is subjected to a discharge of grape and canister from a twenty-four pounder piece of ordnance, and is killed thereby, the result is likely due to one of the shot happening to strike him. But a rifle with a single shot, scientifically aimed, would do better.

I do not say that the old asylum treatment is

altogether unsatisfactory and unsuccessful. Years of isolation and symptomatic treatment by many drugs have perhaps cured cases of inebriety. But I say that science knows a better method. A single remedy can cure inebriety in a few weeks, without a hospital or asylum and without restraint.

Life is short and business is always, in consequence, in a hurry. Men want to make a fortune in time to enjoy it themselves, and, if diseased, the more speedy the cure the more welcome it is. In these days of breathless haste and business method if you want to send a business communication to Europe, you can write several letters and mail them by as many vessels. No doubt they will all reach their destination sometime, if not within the desired time. But the modern business man does not work by that method. As a rule he cannot take the time, or succeed in his business by so doing. Instead of this he sends his message by cable. The cable is the single cure for his business trouble and it is correspondingly speedy.

That great philosopher, Mr. Herbert Spencer, has demonstrated, through his systematic philosophy, that all developments in nature, art, science, and even mental development are from the simple to the complex, from the general to the special, from the undifferentiated to the differentiated. There is no science or art that does not verify this general law. This great generalization of science is an induction from verified facts.

In medical practice we find this law holds good.

It is true in the cause of disease; it is true in relation to remedies. There is but one cause, respectively, for consumption, typhoid fever, small-pox, or other microbe diseases. The remedies, if any are known, are also differentiated and single cures.

The same rule holds good in the disease of inebriety. The single cause of inebriety is alcohol. There can be but a single remedy, if the remedy is a scientific cure.

Speaking in a general sense, or from the undifferentiated standpoint, all inebrieties are caused by poison. But science differentiates the inebrieties into special and single kinds and gives each a single cause. Arsenic, alcohol, opium, ether, and hasheesh are single poisons which cause their respective inebrieties. Each lesion of the nerve centres or other tissues, in relation to each poison, is a variation of the tissue cells, which is caused by the poison and which is the result of nature's effort to tolerate the poison, but which, curiously, always results in a craving for more of the poison.

Disease in general is caused by the microbe, a microscopical plant, a unicellular organism, which manufactures a poison called ptomaine, and this poison causes disease. The different diseases are caused by as many differentiated species of microbe, which manufacture a correspondingly differentiated ptomaine poison.

Science simplifies all things. Before the discovery of the microbe the alleged causes of disease were almost as numerous as the remedies. No dis-

ease was credited to a single cause. No disease had a single remedy. Perhaps the nearest approach to singleness relating to cause was cold. Cold is yet held in great fear by the general public, which is always afraid of "taking cold." The instinctive care exercised by persons who wrap up wounds in much flannel is to avoid taking cold in the wound. Science has demonstrated that blood poisoning in wounds is not the result of "catching cold" in the wound, but of catching dirt, which dirt contains the microbe of blood poisoning.

The early and premature death of the greater number of people born and the sorrow and crimes of humanity can all be traced to the inebriac or else to the microbe poisons.

CHAPTER XXIII.

PSYCHICAL AGENCIES IN INEBRIETY.

THE efforts to establish hospitals for the treatment of inebriety by means of hypnotism or by suasion will always prove abortive. Mental influence of this character simply creates a delusion of the state of belief, or of the judgment, or of reason, or of perception. It does not directly work any real change whatever in the pathology of inebriety or in that of any other disease. It may create any belief whatever relating to any disease. A healthy person may be persuaded that he is ill and believe it; a sick person can be made to believe that he is cured or never had disease; but these imposed states of belief reach no deeper than delusion.

One may recall the circumstance that Sir Humphry Davy, when investigating the properties of laughing gas, proposed to give it to a man who was suffering from neuralgia of the face, but first tried his temperature with a medical thermometer in his mouth. As a consequence the man declared that the pain had ceased. This is a case in point. The man was deluded into a belief that the thermometer had peculiar powers; and it is true that delusion can inhibit or prevent the consciousness of pain.

But the conditions of disease causing the pain remain the same and assert themselves again as soon as the delusion has passed away.

I am acquainted with a medical professor, who, on his way to a lecture, caught a cinder in his eye from a locomotive, while looking from the window of the car in which he was riding. The presence of this foreign body was exceedingly painful and he rode to the college in a street car from the railway depot, unable to open his eye and covering it with his handkerchief. On his arrival he intended to have one of the faculty relieve him by removal of the cinder, but as he entered his room the bell rang for the lecture and he passed immediately into the lecture room, received the usual welcome from the students, and, as he began to talk, the pain ceased for an hour, the duration of his address. He thought the cinder had escaped; but within a few moments after regaining his private room the pain returned and he called another member of the faculty, who applied cocaine and removed the mote from his eye. The intense mental occupation or activity of the professor's mind during his lecture inhibited or prevented the pain caused by the cinder, as represented in consciousness. This effect was aided by his belief that the cinder had escaped by action of eyelids and tears; but all this was a delusion, and though delusion may color any belief and destroy the pain of disease, it may do these things without reaching deeper than delusion; the real disease and its cause remaining undisturbed,

to re-appear after the delusion has been dispelled or the intense mental activity has ceased.

Hypnotism is said to have been used successfully to inhibit or prevent pain during surgical operations. Hypnotism may reach thus far into physiology and therapeutics, or the cure of disease. But suppose a surgeon who was compelled to amputate a thigh for disease of the knee joint were to hypnotize his patient, and then succeed in making him believe that there was no disease of the knee joint, instead of performing the amputation? This would be like the proposed method for the cure of inebriety by the French means of hypnotism. Delusion of belief cannot cure inebriety or any other disease. It may create delusion for a time relating to disease, but the disease is still there. The use of such a means as hypnotism to relieve pain may be justifiable, but used as a delusion, in the pretended cure of inebriety or other disease, is a fraud and imposition.

Nature cures disease by the development of a tolerance to the cause of disease which is created in the tissue or organ which is occupied by the cause. If the cause is a microbe or other poison, the great general law always holds good. To do this there must be no other force at work upon the diseased tissues or organ; or, at least, if other forces be so at work, they will modify or prevent this method of nature's cure, or this development of a tolerance or resistance to the cause of disease.

The effect of the delusion by hypnotism is to

divert nerve currents from certain nerve centres. They are cut out from activities and functions to a great extent, and cut out of consciousness. This lessening of activities prevents their development of the variation of structure which will enable them to resist disease.

I once knew of a consumptive girl, who, at a late stage of her malady, was subjected to some prescription of faith akin to hypnotism. At least she was led to the delusion that she was cured. She believed and acted accordingly. She went about the house, trying to do house work, and the effects of her belief were so far-reaching that the reflex sensations, which provoked her to cough, were abolished, and her cough ceased. This was mentioned as further evidence of her cure. But expectorating the purulent and poisoned secretions and products from the lungs and bronchia is one of nature's methods of tolerance or relief. When the girl's cough stopped, her lungs and bronchia filled up with material which should have been thrown off, and she was found one morning dead in bed as a consequence.

It will not answer to cause delusion in the mind of the inebriate that he is cured. When the delusion passes away the disease will still be there.

Inebriety is a disease. It is not a delusion, a phantom, or an imagination. It is as much a disease of the nervous system as insanity, paralysis, or epilepsy. How would a society of physicians appear who would deliberately build a hospital and equip it with the avowed intention of treating insanity by

hypnotism and other like psychical agencies? The only nervous disease or "habit" upon which this society for the cure of inebriety, or any society, would be scientifically or morally justified in practicing its proposed hypnotism would be chronic imbecility. Their own explanation of the method of cure by hypnotism, if applied to the disease of imbecility, would appear plausible. The society would say: "The imbecile patient visiting for the first time the hypnotic cure will be required to sit down and watch the treatment as applied to others. This gives him confidence and arouses that imitative faculty which is so active in childhood and is never lost in adult life (and is peculiar to imbeciles). When his turn comes he will be told to take his place in an arm-chair and to make his mind as blank as possible; to think of nothing, to fix his eyes and attention upon some special object, from the operator's face or hand, to any object on the ceiling or floor, etc."

Now such a procedure as this, by a society for the cure of inebriety, will scarcely make an imbecile appear to worse advantage, but will fail to improve the appearance or condition of a drunken man.

But I respect the inebriate far too greatly to longer associate his disorder and means of cure with such methods. They may, all of them, enable an inebriate for a time to forget his craving for drink, but the inebriate periodically forgets his craving for drink during a season of sobriety, until the automatic turn is again given to his nerve currents, when

he will again experience another paroxysm of craving and debauch. During his period of sobriety these people say that he should spend his intelligent thinking hours in an asylum, striving to force his mind into a mental state fully realized only by the imbecile.

It would seem vain indeed to treat diseases, known to have verified and positive cures, with remedies which are verified to have no curative power in any disease whatever. Persons afflicted with inebriety will not be likely to invest their money and health in such fancies, however enterprising they may be. Inebriety has certainly verified itself, from the standpoint of therapeutics, to be a curable disease; in fact, the most easily curable of any disease. This is true so far as the knowledge and observation of the world goes. The large number of cures which proves its nature as a disease proves it to be a disease. Before this occurred the world did not believe that inebriety was a disease at all, but simply a vice or a "habit." Physicians who yet cling to this doctrine, and yet attempt to prescribe cures for inebriety, are verily "deep in the bonds of iniquity." Before the human mind, or scientific medical mind, can find a rational cure or treatment for inebriety it must first be recognized as a disease, and then its pathology, or the nature of the disease, must be understood. I claim that the pathology of inebriety is scientifically known, though not widely understood or studied, and even yet disbelieved by far too many. The greater number of the thousands

of inebriates that I have known knew little and cared less whether inebriety is a disease or a habit or a vice. There are thousands more who have never thought of this question; but there are too many people engaged in reformatory temperance work, and even conducting hospitals for the cure of inebriety, who have no rational pathology of inebriety, and who treat the disease by giving drugs for whatever associate disease may happen to be present, and treating the craving for drink by moral lectures, long seclusion, and physical and mental "rest." I have found the better way to be to know the inebriate's pathology and at once cure his craving for liquor; afterwards treat his associate diseases.

The mind has no control over inebriety. The consciousness and will do not affect it. It is true that by force of pledges, or possibly hypnotism, or as a result of some emotional impression, an inebriate may not drink, and may, therefore, not practically be an inebriate; but all such people continually speak of the existence of their craving for liquor, although they may control its demands.

The cured inebriate will always say that he has no craving — that he never even thinks of drinking. The difference between the two is that the former still has the disease, which he can control by will, but the latter does not have the disease.

CHAPTER XXIV.

DRUNKENNESS IS CURABLE.

DURING the past few years medical writers have occasionally appeared who have timidly suggested that drunkenness is a disease. This suggestion has always been overwhelmed by the popular sentiment, derived from religious and moral reformers, that drunkenness is a moral evil; very often a crime, altogether wicked, and only to be cured by religious and moral influences. This state of the public mind existed because the etiology of disease was unknown. Science had not ventilated the cause of typhoid, consumption, small-pox, scarlet fever, and kindred disorders. These things are now understood; it is from the analogy of these diseases to drunkenness, relating to poisons, which has finally suggested to the medical mind that drunkenness is a disease and is curable.

I may say, however, that all the writers on this subject that I am acquainted with have rather ignored the fact that alcohol causes inebriety. They have endeavored to show, and have succeeded in clearly proving to their own satisfaction, it would seem, that drunkenness is associated and caused in one sense by various and numerous diseases of the nervous and general system.

There is a relation of very definite character between bodily and mental diseases and drunkenness; but drunkenness is a disease caused by alcohol, while other diseases have other causes. Other diseases may lead a person to begin drinking, though not from a craving or necessity for alcohol; alcohol causes the disease of drunkenness and the craving for drink. In order to be a drunkard a person must begin drinking from some cause, then continue drinking until the disease is produced; after this the person will drink rhythmically, because he is a drunkard and his disease requires alcohol.

Of course, no man is a drunkard when he begins drinking. This fact follows the proposition that drunkenness can be caused by nothing else than alcohol. People do not inherit the drink mania; they drink from example, fashion, disease, for medicine, and from the thousand and one other well-known causes, which belong to social and physiological existence and life. Drunkards continue to drink because the disease causes a craving for alcohol. The drunkard drinks because the craving for liquor is a symptom of his disease.

No disease can be transmitted by heredity in any other way than by the transmission of the germ disease to the ovum or egg, or spermatozoön, or fœtus. Alcohol is not transmitted in this manner; but even when disease does extend itself in this manner of germ invasion, the poison of the germ is creating in the tissues a variation in the type of the cells, which will resist the germ's poison, which is transmitted

by heredity, and which must eventually antagonize successfully the disease.

The power of resisting a disease is acquired in no other way than by having the disease. The poison of a disease during an attack causes a variation in the type of the tissue cells that are poisoned, and the physiology of this variation is simply the power of resisting disease. A man may be protected from scarlet fever during his life time, because he had the disease during early life; but his children may not be protected because the parent thus acquired and enjoyed an immunity. However, when a variation in type of vegetable or animal, or the cells of either, is acquired from any cause, a part of this variation will be transmitted by heredity. If one-fourth of total immunity is thus transmitted in each generation, in eight generations, provided one parent transmits an acquired immunity, the immunity will be perfect, and this disease must come to an end, provided all people are equal in their relations to this disease.

Now we find that many old epidemic diseases have practically terminated, as the plague, sweating sickness, and the typhus fever. These diseases raged with terrible energy during the dark ages and they terminated before any sanitary measures could have accomplished anything.

Syphilis is rapidly losing its terrors. It is bad enough now, but during the past two hundred years the disease has been growing milder. There is no way of explaining this fact except by the law of

heredity; that the disease has to this extent produced a resisting power to its poison in the tissues of mankind.

One kind of poison may pave the way for another. A person may have pneumonia from a specific germ which may weaken the resistance to tubercle bacilli, and consumption may result. The acute zymotic or mycotic fevers, as typhoid, scarlatina, diphtheria, measles, etc., may be followed by these secondary invasions and secondary diseases. If an old rheumatic joint takes on a tuberculous disease, no surgeon will affirm that the poison of rheumatism causes the tubercles, but their presence verifies the secondary invasion of bacillus tuberculosis. If septicæmia follows typhoid, the physician will acknowledge the secondary invasion and presence of the streptococcus which causes that disease.

However, during the excitement in the medical public mind which followed Pasteur's method of the prevention of hydrophobia, this great general law of pathology appeared to be forgotten by many writers, who published results of experiments tending to prove that animals, starved or fed on shavings, or inoculated with various inert non-multiplying substances, would have hydrophobia. It can make no difference how an animal is fed or with what it is inoculated; if it has hydrophobia, the reason is, so far as pathological light has been shed and observed, that the germ of that disease is present in the animal's spinal cord.

Various nervous diseases, as epilepsy, insanity, paralysis, nerve degeneration, etc., as well as various body diseases, may exist in inebriates, but these bear no relation to the disease of alcoholism, except as they may weaken the inebriate's moral and physical resistance to alcohol, lead him to begin drinking, and cause him to be a drunkard. But all this makes no difference in the character of the disease of alcoholism. The disease is just the same. The intoxication is the same, the acquired resistance the same, the variation in cell type the same, the periodicity or rhythm is the same. An existing disease, leading a person to drink, stands on the same pathological relation to alcoholism, in any particular person, as does the saloon bar, the wine cellar, the example, and personal temptation. None of these things cause the "craving for drink" which belongs to alcoholism, after alcohol has caused the disease. A man cannot be a drunkard until he has drank enough to cause the disease.

I have said that the chief symptom of drunkenness is a craving for liquor, and that while it is true that a man may begin drinking from any cause or no cause, he drinks when he is a drunkard because he has the disease of alcoholism, the symptom of which is a craving for liquor. This is the subjective side of the question; but objectively, the poisoned nerve cells require the presence of alcohol in order to carry on their functions. The sudden deprivation of alcohol causes misery, varying in degree

from sleepless, nervous, tremulous suffering to delirium tremens.

When a nerve cell is adapted to a poison, when an animal is adapted to a station or climate, when a nation is adapted to war, then a change, for a time, works trouble and inconvenience more or less serious, though the final result may in every way be beneficial.

A child adapted to home is homesick if sent off to school. Homesickness can even cause death. A baby accustomed to a warm bath every morning in a temperature of eighty degrees is adapted to that condition, and would very likely be killed if bathed in snow; yet in northern latitudes, according to George Borrow, the gypsy mothers of babes give them such baths with impunity, as a hardening process to the rigors of the climate. Any change from one condition to another to which a person must become adapted is more or less painful and difficult.

The chief evidence of cure of any disease is the recovery of the patient after taking what is supposed to be a remedy. It is not sufficient that a patient may believe and say he is cured, the patient may be deceived; but he must present the objective test that he is well. People must verify by observation and tests that the patient is cured. On the other hand people are not cured unless they are first sick or diseased. Some people imagine themselves sick as well as cured.

Drunkenness is a disease that cannot deceive.

The symptoms are always the same. No expert or technical knowledge, or instruments of precision in diagnosis are required to diagnose the case. When a drunkard is cured, the evidence is equally clear. If the patient says he has no appetite or craving for liquor, and does not drink or get drunk, then why is he not cured? It makes no difference if he sooner or later relapses. If a man is cured of rheumatism, he may present the evidence of cure that is satisfactory to himself, his friends, and the critics; but he may sometime have the rheumatism again. If he does, would this disprove the claim that he was once cured?

I consider myself a pioneer in this department of pathology and therapeutics. I think the medical profession will give me the credit, as will the public, of studying this subject from the standpoint of pathology and bringing the drunkard and his malady into the scope of medical study, placing him among the patients of the medical profession rather than among the convicts and the "sinners." I know of no reason why the drunkard, after he is a drunkard, should be considered a moral reprobate any more than the patient with typhoid fever or consumption.

My treatment for drunkenness is a method of cure no different from the general principles of treatment employed by physicians in other diseases. I am no magician, but a physician. I have never dabbled in hypnotism; I know nothing about it. I am not a shrine builder. I have done nothing but

study, as best I could, drunkenness as a disease, and have looked for a method of curing the disease. I admit that the success is phenomenal; but when I began the treatment of drunkenness I was the only man in the world who was treating drunkenness as a disease, exclusively from the standpoint of medicine. If thousands of patients sought a cure and were cured, it was simply because the treatment was a success.

I may say that a few years ago the few institutions treating inebriates prescribed treatment which was largely "moral" in method. Typhoid patients should also have good "moral" treatment; but if this method is useful in either typhoid or drunkenness, it is just as much an "indication" in one as in the other. I admit that many drunkards are cured by these moral means. Many cure themselves by will power. This fact proves nothing against the theory that drunkenness is a disease and is curable. Typhoid patients will recover without treatment; so do patients with rheumatism, scarlet fever, diphtheria, measles, consumption, cholera, and yellow fever; yet these diseases receive treatment. Perhaps all that these need are moral lectures. As is well known, these diseases are self-limited. But drunkenness is also a self-limited disease in this same sense. The duration of drunkenness is, however, very long in most cases; but in a large per cent. of cases the disease is self-limited. Almost any middle-aged man can recall people whom he has known for twenty-five years, who were, in youth

or early life, drunkards, but who stopped drinking without treatment, or any particular moral influence above the average. The disease "spontaneously" came to an end.

There is no disease caused by poison, in the nosology of human ailments, which is so speedily and successfully cured by scientific medication as drunkenness. The only reason drunkenness is so prevalent is simply because it was not considered a disease, nor was it treated as such.

All diseases have had this same history, even during the past few hundred years. In the middle ages the physicians of Europe were driven from the country, and the clergy took care of the sick. Many of these physicians had a scientific medical education, derived from the University of Alexandria.

The history of diseases, therefore, shows that little by little they were taken from the domain of "sin" and immorality and classed under the rules of science.

The cure of drunkenness is not difficult. It yields readily to medicine. Treatment will antagonize the "habit"—the craving for liquor. In thousands of cases which I have personally observed I have seldom known the craving for liquor to last the patient over three or four days after beginning the treatment. As is generally known I give the patient liquor, which he takes with him. He will rarely drink it after the third or fourth day.

There is much criticism on my method of cure.

No physician treats all his cases of typhoid alike, nor do all physicians treat them alike. Doctors do not agree on the method of treating this or any other disease, so far as special methods are employed. They probably have no special formula which they would agree to publish as a cure for typhoid. In all diseases as treated by competent physicians these gentlemen apply the general principles of therapeutics to the "indications" given by the disease, and do the best they know how. They cure their patients by the knife, or drug, or antagonistic poison, as the case may seem to demand.

I claim that the drugs and methods I use are harmless to everything but drunkenness. The cure of drunkenness does not cause insanity, tuberculosis, hypertrophy, gangrene, inflammation, or degeneration. Neither does the cure for drunkenness cure these other diseases. If a drunkard happens to have a tumor of the brain, the drunkenness can be cured. If he has epilepsy, insanity, chorea, or is a criminal, or if he has tubercles or cancer, a hobnailed liver or Bright's disease, curing his drunkenness is not likely to have any direct effect on these diseases, except to such extent as is unavoidably incident to the removal of alcoholic aggravation by the tonic effect of the remedies. A man may "go insane," have epilepsy, chorea, or tubercles after amputation of a leg for a railroad injury; but these results cannot properly be charged to amputation of his leg. I have been censured greatly for not making my cure, or my formulæ, public. Doctors gen-

erally do not believe in cures, though they may believe in the general principles of treatment of disease. I have no formulæ to make public. There is no secret in the cure of drunkenness, nor is there anything to reveal except a knowledge of the general principles of the cure of disease. If a doctor were to reveal his formula for the treatment of typhoid fever he would be considered erratic, and the public would be unwise to use it without the advice and presence of a physician. It is as impossible to publish formulæ that the public can use for the cure of diseases as it is to publish a formula for the surgical extirpation of cancers for the use of the public.

CHAPTER XXV.

HOW TO TREAT THE DISEASE.

IT IS very wicked when a sober, temperate, healthy man drinks. It is likewise an immorality for women to drink, however old and fine the wine. These things are vices, because such practice and such acts cause disease. It is a vice to do anything which causes ill health or disease. It may be a vice to sit up too late at night and rise too late in the morning. It is a vice to drink water and not know that the water is above suspicion in relation to the typhoid germ. It is a vice to visit the sick if they have contagious or infectious disease; such a visitor may contract the disease and give it to others. It is a vice to wear tight shoes; they deform the feet and create corns. It is a vice to wear tight corsets; they deform incarnate divinity and thus insult the finest conception of beauty in the mind of Him who created the universe and its glory by final design. These things are all vices, wicked, and immoral, because they injure good health, or good form, or directly cause diseases.

But the law says that intent and consciousness are essential factors of human conduct in relation to vice and crime. Cain would not have been branded and made a wanderer if he had killed his brother

Abel by accident and unintentionally. In most of the vices of human conduct, however, there is a very lively consciousness that the divine order of nature and heredity are being violated. Social dissipations which breed sybaritism, indigestion, laziness, indolence, and which certainly predispose to disease, are vices which equal or exceed the vice of drinking, in relation to human excellence, usefulness, and diseases.

The vice of drinking causes inebriety, and inebriety is a disease. It is a disease for the reason that it is caused by a poison. Nearly all diseases are caused by poisons. In fact, every disease which is not a mechanical injury is the direct or remote result of a poison. Now this law must hold true if inverted. It is also true, therefore, that all poison, in sufficient quantity and long enough continued, will cause disease. It is impossible to avoid the logic of this situation; but if the logic can be destroyed, the fact cannot be, and it remains true that alcohol, if continued long enough in sufficient quantity, will cause disease — the disease of inebriety. Now, it is a vice to swallow a "culture" of typhoid bacilli in a glass of sparkling water. The entrance of these germs into the system is by reason of wicked human conduct. Intelligence and volition could have prevented it, and, therefore, it is wicked. But, now, if the germs multiply in the system and cause the typhoid fever, this result is not a vice, because intent, consciousness, and volition have no more to do with it.

When a man begins drinking the act is criminal and a vice. If the law ever interferes, this is the time and place to do it. If a man is ever arrested for drinking, it should be when he takes his first drink. It matters not whether the glass is social and in a bar room, or whether it is in "my lady's" parlor or at "my lord's" dinner table. The only method of dealing with drinking by law is to deal with it when it is a vice, in relation to intent, consciousness, and volition; not when it is a disease and no longer subject to intelligent human control.

The law does not deal with a man who carelessly drinks typhoid poison from his well. The world pities him for this little vice. If the typhoid patient, in the delirium of fever, or as a result of brain disorder caused by the disease, kills his attendant or steals property, the law justifies or condones the conduct on the ground of moral irresponsibility. Such a criminal is legally innocent because morally irresponsible. The law also permits the vice of drinking in the case of temperate and healthy persons. But if such people, when drunk, commit crimes, the law holds them responsible. No intoxicated man is in his right mind. Oftentimes drunken men are unconscious and delirious, and when recovered from a debauch have no recollection of what occurred in relation to themselves during the drunken fit. Such men are morally irresponsible and should be legally innocent.

But justice and sentiment say that the man who knowingly drinks and while intoxicated commits

crime should be punished, because he consciously and with intent drank the liquor. "Letting the law take its course will tend to prevent drinking." This is very doubtful. But if it is true, there is no earthly moral reason why the same rule of law should not be applied to consumption. It is a fact of human knowledge that consumption is contagious. If a person knowingly exposes himself to such a disease, and, taking it himself, gives it to others, he commits a crime. It is a crime for a person with consumption to go about among people exposing them to this disease. Why not arrest the consumptive and put him in an antiseptic jail? Why not arrest and fine him for every public appearance upon the street?

When a man has been drunk three or four times he is an inebriate. If he gets tipsy at the township election in April, and again at the city election three months later, and again three months later at the fall elections, the chances are, if he is a young, susceptible individual, that he will get drunk every three months the next summer, whether he attends the elections or not. During the first year his drinking was a vice, but during the second summer and as long as he continues it his periodical drinking will be the result of inebriety. He drinks because he is a drunkard.

If a young man imbibes too much at Mrs. A's party on New Year's, and again at the club about the first of February, and at a fashionable dinner the first of March, and at college alumni meeting the

first of April, that young man is an inebriate. He will, other things being equal, continue to drink and have one of those horrible debauches every month. Perhaps a vicious or a too highly seasoned social life may cause a shortening of this monthly rhythm ; perhaps remorse or the tears of his mother may lengthen it ; but all the same, your young man, as a result of the vice of drinking, is an inebriate of the periodical variety.

At periodical times then, young men will, as a result of disease, become intoxicated. The automatic craving will return, and, aided and abetted by other inebriates and comforted by society, solaced by drunken companionship, these periodical debauches will continue.

The period of sobriety is not true reform. It is not cure. It is simply a symptom. It is a delusion of cure. It is not reform. It is the rhythmical reaction of the disease. It is only the opposite swing of the pathological pendulum of inebriety, which runs backwards into darkness ; swings out again into the light ; with this play between light and shadow it ticks off the hours of inevitable destiny and impending fate.

Suppose that punishment, the will, confinement, moral suasion, or other mental force or moral agency interfere with or lengthen this period of sobriety ? Is this a cure ? Certainly, such methods do not cure. The disease is not cured by such means, even if the inebriate is confined in prison for years and the enforced period of sobriety is maintained.

As soon as liberated the ex-prisoner will get drunk and will continue his regular debauches.

In fatal cases of alcoholic poisoning, local inflammations of the stomach, cerebral congestion, and effusions are found; but of course these lesions are not inebriety and the cure of such lesions does not cure inebriety. From these facts, and that these lesions will cure themselves or disappear if the alcohol is withdrawn, it was deemed by those interested in the treatment that moral elevation of character and instruction in the terrible pathological consequences of alcoholism were the proper means of curing the bad habit of drinking alcohol to excess.

To further this most desirable end the public schools have been enlisted to teach the pathology of alcoholism. I have seen charts of stomach disease, due to alcohol, used to teach public school pupils, which more resembled Joseph's coat in variety and beauty of coloring than a diseased stomach or a piece by one of the old masters. I sympathize most sincerely with these efforts toward reform; but if I were to teach pupils the terrors of drunkenness by object lessons, I would show them the actual drunkard in his cups or in his prison or the police court. The inebriate is no secret. He is in the family, by the fireside, in all public places. He reels along the streets; he is an ever present object-lesson to the youth of the country. If such education would cure inebriety, the disorder would have passed from the earth ages ago. But alas,

inebriety cannot be prevented or cured by such means.

The entire abolishment of alcohol from the earth would, of course, prevent inebriety. No problem is clearer as a demonstration in logic; but for obvious reasons the measure of prohibition is impossible to carry out. The law is difficult to establish and is usually a failure. I think we need not go far to find the reason that prohibition has thus far been impossible. People go so far as to call disease providential and the remedy the invention of the devil. It is indeed a pessimistic conception of this world, governed by law, to assume that Goodness is the author of disease and Evil the author of a poison which can inebriate, but which is introduced to the notice of humanity as a remedy for disease. I have no doubt that if the filth diseases were destroyed the prohibition of alcohol would follow as a natural and sequential result. The thoughtful reformer, then, will in time be more skilful. He will agitate the question of the suppression of disease. He will so legislate that a fine will be imposed upon persons who have contagions, and cities and the state will be subject to liability for civil damages for the propagation of any acute disease.

The manufacture of alcohol could be suppressed by law; but the existence of the acute diseases could also be suppressed by law. For nearly half a century these germ poisons have been classed as thé "preventable diseases." Then why are they not

prevented? The efforts that have been so nearly wasted in the vain attempt to secure prohibition, had they been exerted to secure good sanitation, would have gone far toward cleaning up the earth.

I look for a millennium in this world, characterized by the suppression of all poisons. Poison and poisoning underlie short life, all the sorrow of the world, and all its evil and poverty. I do not know of a grief, an evil, a sin, a crime or vice that cannot be traced to poison as its ancestor. Children's graves, Rachel's tears, the poverty of the widow and the orphan are due to poison. It is poison that causes disease, that causes the human mind to lose its balance, that causes premature death.

Twenty or thirty years ago if a man had given an opinion that inebriety is a disease, he would have been considered a subject fit for asylum retirement. In the first place, the fashionable drinker would not have felt complimented by classifying him among a list of pathological unfortunates. In society a healthy sentiment was springing up against the vice of drunkenness. Temperance lecturers had the field and temperance organizations saved and prevented all the inebriety possible. But now the number who hold that inebriety is not a disease and curable by scientific means is steadily diminishing. I do not deny that a man may stop drinking by moral influences, or by effort of the will; but I deny that such influences cure inebriety. The man does not drink, but his inebriety is not cured. He knows that it is

his will which prevents him from drinking. The prevention of inebriety depends upon moral influences, if good sanitation and good society are equal; but the will, suasion, good morals, punishment, and all cannot cure inebriety.

CHAPTER XXVI.

CAUSES OF RELAPSES AFTER THE CURE.

A SMALL per centum of the cured inebriates relapse, and a small ratio of these relapses die from some disease of chronic character, usually of the brain or other parts of the nervous system. Critics in the medical profession, who freely attribute these deaths to the treatment, do not always take the trouble to state the nature of the disease, nor whether the remedies caused the death, nor if the death was caused by the absence of an accustomed poison. The critics in these cases, who attribute the cause of death to the remedies used to cure the inebriety, prove too much for the safety and reliability of the profession. The remedies used are drugs which are used by the profession everywhere in the treatment of diseases. If these remedies kill the inebriate patient, then I can see no reason, from the standpoint of this professional criticism, why every fatal case of disease attended by a physician should not be a legal subject for the coroner.

But physicians who make this criticism are not sincere. If they are sincere they are ignorant. In my opinion the causes which lead a person to drink, before he has drank enough to cause the disease of

inebriety, are the reasons why he relapses after a cure. It must be understood clearly, first, in explaining this matter, that the causes which lead persons to begin drinking are very numerous; but after they have become inebriates the cause of the periodical debauches is the rhythmic revival of the craving for drink, which craving is the chief symptom of the disease of inebriety. It must be also clearly understood that whatever bodily or mental disease an inebriate may happen to have, this disease is not the inebriety, nor does it cause the craving for drink.

I think the demonstration now appears clear that the primary causes which lead a person to drink are the causes which bring about a relapse. In many cases the patient is found to be a chronic invalid. These patients usually begin to take alcohol as a remedy. Generally it is first prescribed perfunctorily by a physician to get rid of a troublesome patient. In time the alcohol causes inebriety and the craving brings about periodical debauches. A cure follows. But the invalid has another paroxysm. He is ill and has a physician. He is dosed with quinine, morphine, opium, sulfonal, chloral, and other narcotic drugs. Very likely he is given alcohol in some form, either tincture or in disguise. Either of these narcotic drugs may so deprave the nerve centres that the patient may mistake the poisoning as a call for drink, and either purposely or inadvertently begin drinking again, and thus re-establish the disease. These chronic invalids are usually the victims of old malarial diseases. They

have dyspepsia and occasional malarial attacks. Very often they are great drug takers and undertake to swallow each patent nostrum, and all of them, as prescribed by friends. These nostrums all contain from ten per cent. to seventy-five per cent. of alcohol. One bottle of an ordinary patent "bitters" will cause the staunchest veteran among the cured inebriates to lapse. The cured inebriate cannot drink alcohol without causing a return of his disease.

Many inebriate cases have insanity, or a brain disease — even a remote alcoholic lesion — a sclerosis, or a degeneration of nerve tissue. No matter if alcohol did cause the remote lesion, whatever it may be; this lesion is not a part of the inebriety. The inebriety exists independent of the insanity, degeneration, or sclerosis. The inebriety is cured, but this does not cure the other diseases. But if the patient is insane he may very likely again begin drinking just as he did in the first place, simply because he is insane. If some brain lesion, as a tumor or a disease of the arteries or of the meninges, is present, any of these may have caused the beginning of the drinking; but as they are not cured because the cure for inebriety has no direct effect upon them, they may once more lead the cured inebriate to begin drinking. Some patients with inebriety are not so moral as they might be. They indulge passions over which they should have more control. Sometimes a disease of brain or other tissue may cause a natural passion to assume qualities and gain indulgence which is debasing and ruin-

ous. To my certain knowledge a large number of cured inebriates have lapsed as a consequence of a debauch of the sensual passions in the society of the brothel.

Some inebriates, like other men, are vicious and ill-tempered. They do not court the best society. They may indulge in desperate methods of chance to gain money. They may speculate, even gamble, or "plunge" in horse races. They may play a losing game, and, when all is lost, once more seek the mental anæsthesia of alcoholic debauch. Some of this class of persons, or a variety, are over-persuaded by their friends to have their inebriety cured. They submit, and while acknowledging that they have no craving for liquor will voluntarily seek boon companions and resume drinking. The cure of inebriety will not prevent a man from voluntarily resuming drink. The cure does not bind a man with any description of bond or fetter; it simply sets him free. If he wilfully strangles his liberty, alcohol will again bind him with the craving and agony of disease.

Business complications are the chief cause of suicide. The object of human life, human work and destiny is to earn a living. One-half a man's life exists in the things around him which relate to his work, his worry, his business, and his life. One-half his life is therefore in the hands of his friends, his rivals, and his enemies. Competition in business affairs is very close. There is no reason that the cured inebriate should not meet with business mis-

fortune. In fact, the truth is that most of the cured inebriates have a business position to regain that was lost, and are behind in the race. Many of them fail. They are not always equal to competition and rivalry, and they must meet, with less preparation and ability, the general changes in public financial affairs and business relations. They are not mentally equal to other people, perhaps, who have never been inebriates, in endurance of the strain of misfortune, or business failure, or even the disappointments of a want of success. These men are all in dangerous positions. They do not have the craving for liquor, but feeling mentally weak and hoping the stimulant may help tide over the mental strain they cautiously begin drinking. Very few cures under such circumstances ever survive the first drink. These men were tempted in this manner to begin drinking. It was such a nervous constitution as this and such business relations that caused them to begin drinking, and these original causes act once again with the same effect.

The social relations of alcohol are varied as are the phases and conditions of human society. Wine is a fashion, a luxury, and an instinctive remedy for sickness and accident. The good and the noble, the virtuous, the refined, as well as the wicked and the depraved, all have their times, moods, places, desires, or necessities, to which alcohol is adapted, as whisky, brandy, wine, beer, absinthe, or other drinks. The club men, the saloon habitues, the dealers in liquor, the medical profession, all exert

an influence which is far reaching and powerful. Drinking is a custom of Christendom, and custom is hereditary by the force of tradition. The custom of treating is a social force as strong as brotherly love, or the bonds of church or party in social life.

The cured inebriate returns to his club, or his friends among the men who frequent saloons. He meets the people who sip wine at fashionable dinners. He encounters friends, old or newly made, whose impulse to treat may be irresistible.

Through some of these influences the cured inebriate may be tempted to risk a drink when once more the tide of alcohol rises above sense and reason, and once more the king of debauchery—the craving for liquor—is enthroned as ruler of brain and destiny. The treating custom is more demoralizing than plagues and pestilence. People who so freely vent their vengeance in words upon the saloonkeeper do not stop to think that seventy-five per centum of the liquor sold is bought by the man who treats and is given to the man who drinks. If a line of ten men stand before a bar, and one man buys ten drinks, the saloonkeeper sells to only one man who drinks. This man gives away nine drinks to as many companions, and among these may happen to stand cured inebriates and youthful friends.

Notwithstanding all these causes not more than five per centum of the inebriates cured by my treatment lapse, so far as I can ascertain. The forces of disease, habit, custom, and accident must prevail.

But, as I have said, the cure for inebriety will

not directly cure associated diseases, or restore wealth, or re-establish broken family relations, nor prevent final death.

A study of the subject proves most remarkable things. The cure of inebriety prevents suicide among the class of inebriates in a ratio of over thirty per centum. It lessens insanity among the class of inebriates eighty-five per centum and permanently cures circular insanity caused by inebriety in all cases. The cure has re-established thousands of families that were scattered by drunkenness, poverty, and divorce. It has already saved, by the labor of cured inebriates, an amount of money that must be counted by millions. The wealth of the inebriate class has grown in proportion to their good morals, temperance, and charity, as a remote result of the cure for inebriety.

CHAPTER XXVII.

THE RELATION OF PROHIBITION TO SOBRIETY.

THEORETICALLY the problem of "temperance," or sobriety or total abstinence, seems to be easy of solution. People manufacture, sell, tax, and drink alcohol and become drunkards. The cure then rests with the people themselves, who must simply stop the manufacture, sale, taxation, and drinking of alcohol. Of course, if there is no alcohol, people cannot drink it.

But like some other local problems this theory will not work in practice. Prohibition has never succeeded. Neither this law nor the laws of high license appear to diminish the manufacture and sale of alcohol and its consumption.

As everybody knows, the government tax and local taxation by cities far exceed in amount the price of the alcohol manufactured ; but it would no doubt work well and satisfactorily were the government to raise only a single tax, not upon land but upon alcohol. There is no doubt that alcohol would pay all the expenses of the government.

The states of Maine, Iowa, and Kansas are the typical prohibition communities, or have furnished the lesson to be learned by prohibition legislation.

The lesson simply is that prohibitory laws do not prevent the manufacture, sale, and drinking of alcohol. The only result is the loss of revenue from the taxation of the liquors. The unbiased observer will conclude that there is some good reason for the public's taking the risk of the penalty of the law, with the added penalty of strong drink; and the true moralist and humanitarian will try to find out this reason.

There are some general rules governing the production of inebriety which appear to be infallible. One of these is the definite relation of the number of inebriates to the amount of liquor consumed by any community. There is no such disease as "sporadic" inebriety. The inebriates come from communities which consume the proportional amount of alcohol. If there is no alcohol in a community, there can be no inebriety. If there is inebriety, alcohol is certainly there, and the consumption of alcohol will result in the production of a definite amount and proportion of drunkards.

Prohibitory laws do not prevent inebriety. At the most they can do no better than to make the traffic in liquors secret and somewhat difficult. If the people refuse to observe a law, the law is a dead letter. Prohibitory laws are dead letters.

This being the fact, it is well to inquire after the reasons. I think they are very clear and easily understood. In the first place, alcohol is used as a medicine. It is prescribed by physicians. I presume that every case of illness is treated with more

or less of alcoholic stimulants. At the present stage of the development of medical science, if a physician abjures alcoholic stimulants he is denounced as a fanatic — a "crank." It is impossible to treat the acute fevers as satisfactorily without as with alcoholic liquors. Alcohol, in these diseases, supplies a food force, it lowers the temperature of fever, it stimulates, and perhaps more than any other drug has the power to prevent the threatened "heart failure." Besides this, alcohol is a powerful germitoxic. It antagonizes the symptoms of disease and also antagonizes the microbe. All prohibitory laws recognize this fact, and the use of alcohol as a medicine is one of the large "holes in the skimmer" to be found in all prohibitory statutes. With such a law including such a necessary exception it is apparent that sickness and the anticipation of sickness will succeed in supplying large quantities of liquors for actual illness, and no doubt for the "comfort" of many a prolonged convalescence.

Medical science must develop considerably more before alcohol will ever be stricken from its list of remedies. But this time and this development will come. The signs of the times indicate that disease will, perhaps not very far in the future, be treated by specific cures instead of general remedies, as is now the rule. When this time comes there will be no further use for alcohol in disease. Its use will be limited to surgical cases, of shock, etc., and the probability is that it will be superseded by some other remedy even in these cases.

But at present the reason that prohibition fails is because people use alcohol for injuries. Any painful injury affecting the sensory nerves causes an impression of heart weakness. In extreme cases there is shock or heart failure. Alcohol is the remedy for this condition of things. It is speedy and efficient. This fact has made alcohol through centuries of use the instinctive remedy for sudden illness and the pain and shock of injury. It is the family remedy. The father of a family, as well as the mother, feels a sense of security during waves of temperance agitation and the enactment of prohibitory laws, if there is locked up securely in the closet a bottle of good brandy for the emergencies of illness or injury.

But alcohol is also the natural antidote for unsanitary conditions. The rule of American cities is to putrefy sewage in rivers or other public places, polluting the air, soil, and water with the germs of disease.

The relation of sanitation and intemperance is interactive. No doubt can be sustained that unsanitary conditions and resultant illness underlie intemperance. But the result of intemperance, or inebriety, also aids the progress of disease. A drinking community has very little physical resistance to disease. Pneumonia is generally a fatal disease to an inebriate. Inebriety predisposes people to take diseases and lessens their ability to survive. It is true that alcohol resists disease poison, and it is also true that inebriety has little or no re-

sistance to disease. Unsanitary conditions, then, cause disease and cause inebriety, which aids the fatal consequences of diseases. The true method of prohibition should be to prohibit the unsanitary conditions.

People overwork and get rich in America, or else they fail and worry. Either condition brings neurasthenia, and may bring inebriety. The great race in this country is the struggle for money. A few years ago one quarter of a million gave a man all the reputation he desired and sought; but now there are too many examples of many millions in a fortune, and the index of wealth which now satisfies human ambition must point to the figures of the multi-millionaire.

Overwork and worry create physical and mental conditions which demand a remedy. Alcohol is the remedy. It anæsthetizes the worry and pain and the fatigue of overwork. It supplies the places of rest and vacation. The struggling business man takes very little rest. He becomes a slave to his work, with his soul and thought and life bent to one purpose — to get rich if he can. He sends his family away on vacation visits, but stays at his place of business himself. This man may gain the whole world; he may instead lose his life; but at any rate, his greatest danger is inebriety. The business-men — the overworkers of America — find alcohol to be a remedy for fatigue and worry, and a fashionable congratulation for business success; and these men will not observe prohibitory laws. They may ac-

quiesce in a prohibitory statute, for philanthropic reasons, but these gentlemen take good care to know where their supply of necessary medicine is located.

But the greatest difficulty prohibition encounters is the craving for strong drink which belongs to the inebriate as a symptom of his disease. The ratio of inebriety to the population is very large in the unsanitary towns of the United States. There are well-known and recognized periodical inebriates, secret inebriates, and inebriates who deny that they drink; but the larger class of this description are the moderate drinkers, who do not get drunk but who drink habitually every day. The latter class do not drink secretly, but are those so considered temperate drinkers, who can "control their appetites." These inebriates control their appetites very well indeed, after their appetites are fully satisfied each day, or every few days. But if these gentlemen attempt total abstinence, they find that their appetites are not controllable. It is this class of inebriates which consumes the larger amount of alcohol that is consumed in drinking cities.

These gentlemen may affect to acquiesce in prohibitory laws, as also may the other varieties of inebriates. Men who want to stop drinking will favor prohibition, through a vague hope that somehow the difficulty of obtaining liquor will favor their reform. But this measure and vague hope will not cure inebriety. The whole brotherhood or class of inebriates find that they must have the liquor,

even if the laws are violated. The result is that the law is violated, and the disease of inebriety pursues the wretched misery of its way.

In my opinion these are the principal reasons why prohibition is unable to prevent the manufacture, sale, and consumption of alcoholic liquors.

Some worthy people suggest that if the general government were to prohibit the manufacture and sale of liquor, the law would be a success. Such a law would deprive the general government of a revenue nearly equal to the pension appropriation, and the legislature will therefore be very conservative in the enactment of laws destroying this revenue. But if such laws were enacted, they would be dead letters. If sanitation were such that people did not feel the want of liquors, and were the inebriates all cured, I truly believe that prohibitory laws could be enforced ; but so long as filth and the preventable diseases are not prohibited, so long will alcoholic liquors be consumed by the public as beverage, antidote, or poison. Many people seem to think that reforms can be brought about by a sort of spasm of the social forces. Outside of war no such occurrence was ever known. No sanitary laws could at once prevent the social vices or develop public morals. Sanitation and the development of public ethics is a development and not an enactment. Thousands of years were required to cause the development of human public morality in the historical nations — from the epoch of human sacrifice to that of the "Golden Rule." If there

were no law of development in morals, as in everything else, the Sermon on the Mount would have been preached to the remote ancestor of the Kings of Israel, at the door of his cave dwelling, more than fifteen centuries before the Christian era; before the exodus, the wilderness, and the land of Canaan.

The curse of humanity is poison. It is poison which underlies, in human life, early death and all the evils of disease and intemperance. It is preventable disease poison which shortens the average duration of life and which underlies intemperance, inebriety, and all their associated social miseries. But in the development of the prohibition of all poisons, which must finally occur, the disease poisons must go first.

I cannot avoid the conclusion that our earnest and enthusiastic social reformers are working at a great disadvantage. Too little preaching is heard on the subject of sanitation. There is too little effort to prevent disease and too much to prohibit a confessed remedy. "Pure, sparkling water" is apotheosized as the God-given drink for the nations; but through the neglect of sanitation the water is polluted with the germ of disease. First purify the water, then burning thirst, whether at the banquet table or in the harvest field, will reject the drink which may antagonize disease, but which puts delirium on the throne of reason and binds the brain in the shackles of decay.

Sentiment is a reformer which no doubt has per-

formed great good in the world at great expense; but the condition of human liberty, in relation to government at the present stage of history, weakens sentiment as a force in reforms. Sentiment can do little more now than sympathize with criminals, or set the fashion in dress. The day has come when science is asserting her claim to dictate reforms in politics, government, ethics, and other social institutions of humanity. Prohibition of alcohol is a sentiment; a noble one it may be, but prohibition of alcohol without the sanitation which prohibits disease poison is a scientific error.

CHAPTER XXVIII.

THE RELATION OF WOMAN TO INEBRIETY.

I THINK all men will acknowledge that woman is the divinely appointed guardian of the morals of the family and of society. We must acknowledge even more than this, which is that woman is the moulder of character as it is developed in the minds of the child and the youth. The much talked about "woman's sphere" is necessarily the world which is mapped out in the architectural plans of the home, and whose blessed inhabitants are the children of the household. Here she is the arbiter of destiny, the queen of the realm; the tutor, the mentor, the mother, the very angel of peace and good will to men. The family is the unit of society and of the great aggregations of humanity which form states and nations. You will find very little in any state or community which you will not find in a family, as relates to moral and intellectual development, the true business and work of life, good government, and, in fact, the general phenomena and principles of living and of life. The family circle is an epitome of national life, and no doubt different families show examples of the various forms of government, as represented by absolute monarchy, aristocracy, and government by the people.

But the home is the school where early impressions are made upon the plastic brain of childhood; which impressions never wear away. These impressions shape the character and the life of the man or woman with their success or failure.

There is more, very much more, in education than in heredity, as life is manifested by human beings. There is more in training than there is in heredity. In fact, the great distinction between the human creature and the lower species is the fact that animals are so little susceptible to education, inheriting their knowledge; while men and women inherit so little and their capacity for education seems to be boundless.

I think that the most interesting and vital questions which concern mothers are those of inheritance and education. We hear a great deal about a bad and good inheritance. The general rule of inheritance is that no direct evil is ever hereditary. The heredity of a seeming evil is simply a lack of development of good qualities. Evil is forgotten by nature in hereditary transmission. It is true that the children of the vicious are likely to be also wicked; but if they inherit a small capacity for good, and are educated by vicious parents, or teachers, or associates, there is an ample reason for their viciousness without calling upon heredity to explain matters by the admission that evil is ever inherited. Use and disuse underlie all development. If the human brain is developed it must be by use, that is, by education, school education, and the learning

given by the practical affairs of life — the mental struggle for existence. If people are thus well educated, they will transmit the capacity for good education, good mental work, and a high ethical development; but only the capacity will be inherited. The education itself is also left out by nature in reproduction.

But we say evil is directly transmitted. This is not true. The only evil ever inherited by anybody is simply a small, or weak, or undeveloped capacity for being educated in good works. Sometimes we hear people say, when men whose ancestors were wicked do badly, that "blood will tell." But it is simply in these cases the lack of "blood" that tells. The human heart is prone to evil. All lower animals, as measured by the human standard, are not at all "moral" in their lives. High morality is a development, an education, the capacity for which is hereditary; but hereditary crimes, misdemeanors, and immoralities, as well as diseases, are inheritances of the lack of a developed capacity for intellectual and moral education, and, in the case of disease, simply an inheritance of a feeble resistance to the causes of disease.

The primitive man, living in a cave, had very little moral or intellectual development. The barbarians and semi-civilized have little education or capacity for learning; but all people know that if a wild tribe is educated, generation after generation, the race will improve mentally and morally. The

hereditary transmission of increased brain development will give them, generation after generation, a greater brain capacity and capability for improvement.

No deformity resulting from disease, or accident, poison, ignorance, or immoralities is ever transmitted by heredity. Inebriety is not hereditary. No disease is hereditary. No result of disease of any character is hereditary.

The inherited capacity for education, or the inherited brain development, greatly exceeds the uses made of it. Education in method and extent is perverted, mistaken, and insufficient. In fact, some of our best thinkers say that collegiate education is not adapted to the needs of life and is not practical. These men say that the mental development of the youth is dwarfed by classics and starved on higher mathematics.

It is surprising how few of the world movers like Watt, Edison, Ericsson, and hundreds of inventors, pioneers, and discoverers, are or were college educated. Education is bound by creeds and tortured by dogmas. The great brain capacity inherited by men and women is seen in the biographies of our great men in statesmanship, science, literature, and other departments. Circumstances put these men into positions where their native good sense and wide brain inheritance were called into action. As a rule these men were uneducated, as we understand this term. But they proved equal to the practical

emergency at hand, and their names are the brilliant lights of the history which tells us how civilization was developed.

But education begins in the home where the mother is tutor. She has before her nature's great seeming miracle, a child, with a brain which is the product of the thought, the experience, the loves, fears, hopes, grand successes, and overwhelming disappointments of the centuries of time and the generations of men. The future of that child depends in a great part upon its nursery education, upon the first impressions made upon the plastic tissue of the brain. Heredity may possibly have overlooked and omitted the glory of a century or two in the reproduction of that brain, but heredity makes few errors. You may be assured that heredity has left out the impressions of evil and has carefully put in all that was possible of the good; the development of use and of educated experience. Here is this wonderful structure, like a great organ with its hundreds of keys, stops, and combinations, ready for the touch of the musical expert. You may be assured that the first melody is the song of affection, the grand oratorio of human love. The mother's touch never wakes the discord of hate. But here in this nursery with this child and its mother is conducted the lesson of human destiny. Will she put the stamp, the burning brand of alcohol upon that most wonderful creation, the brain of her child? Has she done so before its natal day? If she has or does, let her look forward at the devious, dark-

ened, and uncertain path of her child through life. The stamp of inebriety will color every act, will bring sorrow, will prevent success, will set discord to the music of praise for victory, will bring perhaps an early death.

The influence of women in the prevention of intemperance has led the van of crusade, suasion, and pledge. Woman is the sufferer when husband, brother, or son are inebriates. No place on earth or under it, nothing outside of the inferno, contains or exposes more human agony or degradation than does the drunkard's home, and the wife is the chief sufferer. The strong arm which should support her is palsied by poison. The manliness which won her maiden love is debased. The intellect which commanded her pride and respect is darkened by stupor, coma, or maudlin vaporings. Alcohol stains the breath which once bore to her waiting ears the tender words of confidence and affection. You cannot refine drunkenness. Neither wealth nor fashion can atone for the loss of thought and the intellectual coma from poison. The mind is equally lost when debauched, whether in a hovel or a palace. Alcohol is equally at home and equally vicious, whether the victim is clad in broadcloth or in rags. Wherever there may be happiness, in the home of humble industry or in the residence of fashion and luxury, when inebriety enters happiness becomes an outcast.

Woman is the steadfast friend of the cure for inebriety. Her intense mind at once grasped the

new idea and the truth that inebriety is a disease. Her loving nature stood ready to forgive alcohol and the inebriate for the purgatorial tortures of heart and home and happiness; but the mother, the sister, and the wife, while forgiving and pitying the loved inebriate, insist on his cure and his restoration to sobriety. A wife's love will follow a man through misfortune, through self-abasement, through drunkenness and its degradation; however low he may fall the wife will be found by his side, her loving embrace clasping even the senseless clay when the waves of debauch have engulfed sense and consciousness; but no influence can be compared with that of woman in compelling the inebriate to adopt the means of cure. If not for her influence and her watchfulness and care, the fatality of the inebriate debauch would exceed the present rate by possibly twenty-five per cent., and the number presented for treatment and cure would be far less. To-day, as always, the inebriate's best adviser is his wife, his sister, and his mother. When the inebriate was known only as a criminal these women believed in his moral uprightness and pitied his misfortune. They labored with tears and strove by pledge, suasion, and prayer to reform the wickedness of the craving for drink. They condoned the awful misfortune of debauch, and forgot the language which the imbecility of the drunken man heaped abusively upon devoted heads and trembling hearts. Woman is better than man. She is intense in mental and moral life and feels her responsibilities very keenly.

Sometimes a woman falls from her high station, like Lucifer from the skies, while the whole world looks on as at the shining track of a meteor. But the history of good works is the biography of the sisterhood of the Earth. No photograph of the cross while it held the crucified Saviour could have been taken without containing the figure of a woman; and no enterprise under the name of Christianity since the Star of Bethlehem shone over the hills of Judea has ever been adopted for the moral and religious advancement of humanity, that was successful, without the sanction and work of woman. The moral labor of the world in developing character and mind is the labor of an artisan upon an ornament of beaten gold, designed to crown the brow of a perfected manhood and show the skill of human workmanship. But when the crown is made, the great jewel, the Kohinoor of great price, which it must bear in the golden setting, is the character and labor of woman in the intellectual and moral perfection of the human race.

CHAPTER XXIX.

A REVIEW OF THE DISEASE AND THE CURE OF INEBRIETY.

ALCOHOL is a stimulant; it furnishes energy and liberates energy already stored. Energy of the body is subject to the laws that are given to energy everywhere, and these general laws are known as the "conservation of energy" and the "correlation of force." When alcohol is taken into the body the energy which was required to form the combination of the molecules of this compound is liberated, or the alcohol is oxidized; this liberated energy is not lost in the body, but is correlated into the physiological forces of the body, being transformed into nerve, muscle, and gland energy. The alcohol is oxidized and the liberated energy is turned to heat, or is heat. The heat, if in a gland, is converted into the forces of the gland; the same law holds with muscle and nerve. Alcohol consumed in the liver increases the function of that organ; consumed in the tissues of the heart the liberated energy is changed into muscle and nerve energy; the same law holding good as to the brain, kidneys, lungs, or other organs. Out of this necessity, from the chemical standpoint, alcohol is a general stimulant. It stim-

ulates the brain and all nerve centres, and increases nerve activity, the power of the heart, and the excretory and secretory forces. There is no organ or function which it does not stimulate; it is, therefore, a remedy in disease and injury, second to no other known in point of availability, promptness, and certainty of action. These properties of alcohol are so well understood that the drug has become a popular remedy in all diseases and injuries of an emergency nature. It is, if such a thing is possible, an automatic, or an instinctive remedy. In any injury or sudden illness, involving pain and faintness, liquor is the article loudly called for, and is in universal use throughout Christendom. But whether alcohol is a stimulant or not depends upon two factors. The first is the quantity used as a dose ; the second is the condition of the system, which condition relates to the disease or injury, and also to the degree of tolerance that the system may have to alcohol. With relation to the dose or quantity taken the latter is either a stimulant or a depressent.

The general law of poisons is that in a small dose any drug is a stimulant to any tissue or organ to which in a large dose it is a poison. The effects of the small dose and large dose are opposite. In a small dose it stimulates the brain, causing increased activity and power of mind, gland, and muscle. In a sufficiently large dose it causes the sleep of coma and the general paralysis of death. It simulates death. In poisonous doses it paralyzes all organs ; it can stop the heart, paralyze the brain, destroy the

mind ; there will be no digestion, excretion, or secretion, and death may be the final result. From the mental standpoint the effect of a small dose is a typical insanity, delirium and delusions, with hallucinations of sense. Then follows a paralysis of the higher centres, with the mental accompaniment of dullness, stupor, and finally the oblivion of mind in coma. From the physical standpoint there is exaltation of strength and activity, followed by paralysis of all voluntary muscles, which may involve those of the circulation and respiration, resulting in death. Alcohol is, therefore, in small doses a stimulant and in large ones a poison. In small doses it is a medicine — a remedy ; in large doses it destroys life. As a remedy it is more generally and universally used than any other drug ; as a poison it destroys more lives than all other poisons combined. But whether in large or small doses, as poison or remedy, alcohol has another effect upon the system. It causes a special disease — inebriety.

These are laws of poisons : The first is that a drug is a stimulant to tissues in a small dose, upon which it acts as a poison in a large dose. The second law is that a drug which so acts as a remedy and a poison creates a tolerance in these same tissues to the action of the poison, and also creates a craving for the poison. This law is particularly exemplified in such poisons as morphia, chloral, and alcohol.

The disease of inebriety is a lesion of the tissue cells and nuclei caused by poison. This lesion is a

variation of the molecular type of the cell ; it is a re-adjustment or re-arrangement of the molecules of the cells, designed to give to tissues a resistance to the poison. This is an inevitable sequence of all poisoning which does not cause immediate death. This variation, or new condition, which causes a tolerance to the poison, or an increased resistance to it, also causes a craving for the drug. The craving for poison is inebriety, and inebrieties can be caused in no other way than by the action of respective poisons. In this manner are brought about alcoholic, opium, chloral, ether, arsenic, and all other inebrieties.

The first disease caused by alcohol, and which is an invariable result of poisoning by alcohol, is inebriety. Its presence is characterized by a craving for drink and by an increased tolerance to the action of the poison. The symptoms consist of a periodical craving for liquor, caused by an automatism of the cells; then follows a debauch, or a spree, or an attack of acute alcoholic poisoning. There follows an automatic reversal of action, which causes a disgust for the drug, accompanied by vomiting, indigestion, and sometimes by certain nervous symptoms, known as delirium tremens. The mental accompaniment or result of inebriety is alcoholic insanity. This mental disease is caused by an automatic periodical craving for liquor, succeeded by the poisoning, with mental derangements of hallucinations, mania, delusions ; then melancholia, followed by an interval of sobriety. The debauch consists

of the daily periodical paroxysm of craving, mania, delusion, stupor, and coma.

Alcohol produces an imitation of nearly all diseases. It causes pseudo-ataxia and numerous other lesions of brain and spinal cord, pseudo-degenerations of nervous structures, and multiple neuritis; also pseudo-degenerative lesions of lungs, stomach, liver, kidneys, and other organs. The more remote effects of the poisoning seem to be brought about as follows: The pseudo-degenerations and inflammations pave the way in the tissues for secondary diseases, the chief of these being tuberculosis, and more specific lesions of the brain, spinal cord, the liver and kidneys, caused by the pathogenic bacteria. The pathological philosophy is that alcohol by causing these pseudo-diseases is the source of the more remote diseases, the reason being that alcoholic lesions destroy or lessen the resistance of the tissues to the invasive forces of the microbe. Alcohol may, therefore, be responsible for all or any of these organic diseases directly and remotely.

All drinking is periodical or rhythmical, and is not "constant" or "steady." It would be impossible for any inebriate to drink "steadily" except he were under surveillance and the drug were given in stated doses at regular intervals. This attempted differentiation between constant drinking and periodical debauchery is the irregularity of the quantity drank and the time between drinks. Close observation of any case of inebriety will show that the factors of inebriety are a craving, a debauch,

and a reaction. These are the necessary phenomena of inebriety, or the factors of inebriety. Logically, if there is such a thing as steady or constant drinking, then there is but one factor of inebriety, which is steady drinking, with its result of intoxication. But nature insists on rhythm in all things. If drinking could be "steady" or "constant," then there would be but one factor in inebriety and that would be an equally steady intoxication. This is impossible. It could not be produced, even under the strictest surveillance. Suppose precisely four ounces of the same brand of liquor were given to an inebriate every four hours. Nature even then would assert herself and display the phenomenon of rhythm, which makes possible all the phenomena of this world, whether of life, mind, or physics. If a man is put under strict surveillance and given precisely four ounces of liquor regularly every four hours, the phenomena of symptoms resulting would be as follows: During wakefulness, or from the breakfast hour until nearly evening, there would be little or no manifestation of drunkenness. The higher nerve centres would be active with the impressions of the daily life. The inebriate could attend to business during the morning hours; he would gain some appetite and digestive power by midday, when he would be able to take a meal and digest it. But by four or five o'clock in the afternoon the higher nerve centres would become fatigued. There would be a heavy accumulation of álcohol in the brain and the symptoms of intoxica-

tion would follow. Three hours later the sleep of coma would succeed and last until morning. But if any person, even an inebriate, is given this amount of liquor every day, a week or more is required to establish an average amount of tolerance to the drug. When this degree is established the resulting symptoms will be about as given.

No regularity in the giving of alcohol can control the rhythms of all physiology and of all nature; yet this would be necessary to establish a single case of what must be meant by steady drinking, instead of periodical drinking. The only difference in drinking, from this standpoint, is the duration of the interval of sobriety. This duration may be a few hours, a few days, or a few months, or, even, a few years. The periodicity, however, is always the same in quality; it differs only in quantity. But no inebriate will drink regularly as relating to time or quantity. This is impossible. All inebriates drink periodically; the paroxysms of drinking vary, according to the day or the night, or the condition of the stomach or of the nervous system.

There is no such thing as "steady drinking." All drinking is rhythmical or periodical, and all symptoms of alcoholic poisoning are the same. The only difference in the several cases is the length of the rhythm.

The general principles underlying my treatment of inebriety are as follows: First, the only cause of alcoholic inebriety is alcohol. Second, inebriety is a variation in type and conduct of the nerve centres

and cells, which variation results in an automatism requiring a periodical poisoning by alcohol.

My remedies antagonize this effect of alcohol upon the nerve cells and break up the rhythmical automatic craving for liquor. Automatism is the foundation of alcoholic inebriety, and the rhythm of the automatism is the key to its existence.

The remedies do not cure the associated diseases of inebriety, as consumption, kidney disease, or other ailments. I claim to destroy only the craving for drink, and this I have never failed to do, unless a barrier is presented by reason of antecedent physical or mental conditions, whereby the system will not tolerate the absence of accustomed alcoholic stimulation.

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